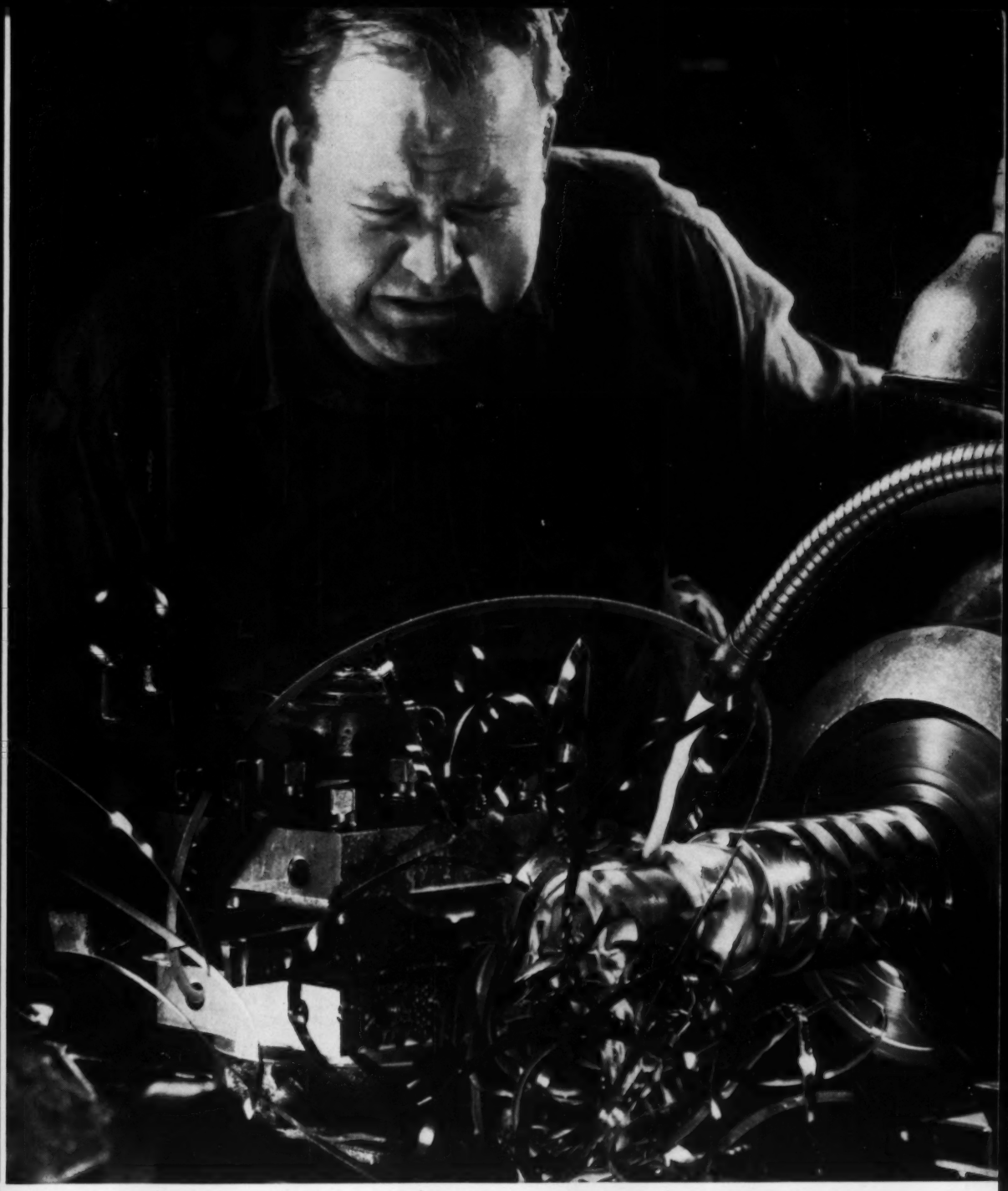
STEEL
The Metalworking Weekly
A PENTON PUBLICATION
MARCH 20, 1961



How to Avoid Common Machining Mistakes 96

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CHECK YOUR GEAR NEEDS

- ☐ SPIRAL BEVEL GEARS
- ☐ HYPOID BEVEL GEARS
- ☐ STRAIGHT BEVEL GEARS
- ☐ SPUR GEARS
- ☐ HELICAL GEARS
- ☐ FLYWHEEL RING GEARS
- ☐ SPLINE SHAFTS
- ☐ GEAR ASSEMBLIES

and remember all **DOUBLE DIAMOND GEARS**

are built to produce low installed cost . . . to serve economically and dependably on the job for which you buy them . . . and to do credit to your product and reputation.

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GEARS FOR AUTOMOTIVE, FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS
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Attached to booster rocket, shoes like this guide missile along overhead rail of launcher.

For the ultimate in impact strength . . . this missile launching shoe is FORGED

Low weight, high reliability, shock resistance, great strength, toughness—this vital part has all these . . . because it's drop forged.

No other process can develop so much useful strength for high-stress applications. But forgings have other advantages, too—design freedom, for one. Just look at the complexity of the forged-steel launching shoe above. Notice the recesses forged right into the product—saving weight, reducing machining steps, cutting manufacturing costs.

Forgings begin with proper design . . . sound steel. An experienced forgings engineer can translate almost any parts problem into a practical forging design. And when it comes to production, no one knows better than your forgings supplier that *the quality of the steel is a forging's most important ingredient.*

This is why so many forgers use Bethlehem steels—carbon and alloy bars they can always depend on. You'll find you can depend on them, too.

Steel

for Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

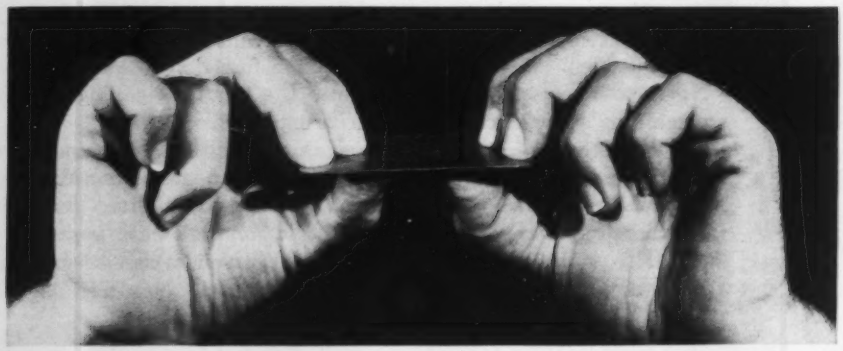
BETHLEHEM STEEL

How Armco puts multiple

Strong sheet steel is given a .001-inch thick coating of aluminum on each side by a special Armco-developed hot-dip process. The result is Armco ALUMINIZED STEEL Type 1, a unique material with advantages of steel, features of aluminum, and bonus benefits all its own.

RESISTS HEAT AND CORROSION—ALUMINIZED STEEL Type 1 withstands temperatures up to 900 F without discoloration, to 1250 F without destructive scaling. It also resists corrosive condensates that form on cooling. Real advantages in mufflers, furnaces and similar products.

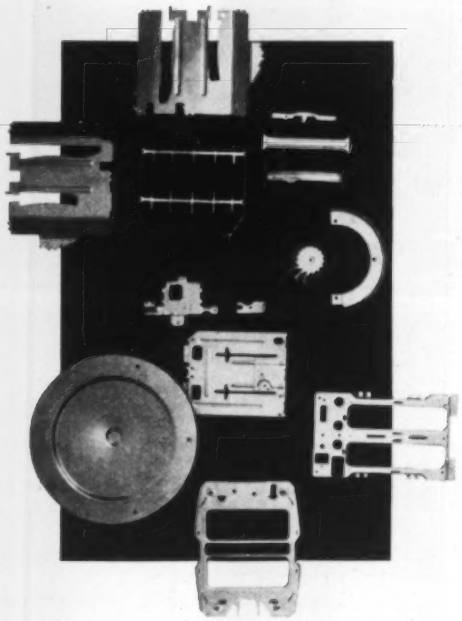
REFLECTS HEAT—To 900 F, ALUMINIZED STEEL reflects up to 80% of radiant heat, helps direct heat where you want it, cuts down heat loss. Hundreds of parts for large and small appliances are now proving the practical benefits of this heat reflectivity.



STAYS STRONG—Parts that resist or reflect heat can double as structural sections when made from Armco ALUMINIZED STEEL because it keeps its strength at high temperatures. This also permits thinner, more economical gages than with metals that weaken under heat.

New steels are born at Armco

Steel with an aluminum coating benefits at your fingertips



TAKES FABRICATION—Armco ALUMINIZED STEEL Type 1 withstands moderate forming, drawing and spinning operations without flaking or peeling of the coating or damage to base metal. This workability, coupled with its other outstanding properties, accounts for its successful use in a growing number of industrial, commercial, and consumer products.

Use this label to tell customers your products are made from modern, dependable steel.

SEND MORE DATA

Armco Division
Armco Steel Corporation
1291 Curtis Street, Middletown, Ohio

Please send further facts on Armco ALUMINIZED STEEL Type 1.

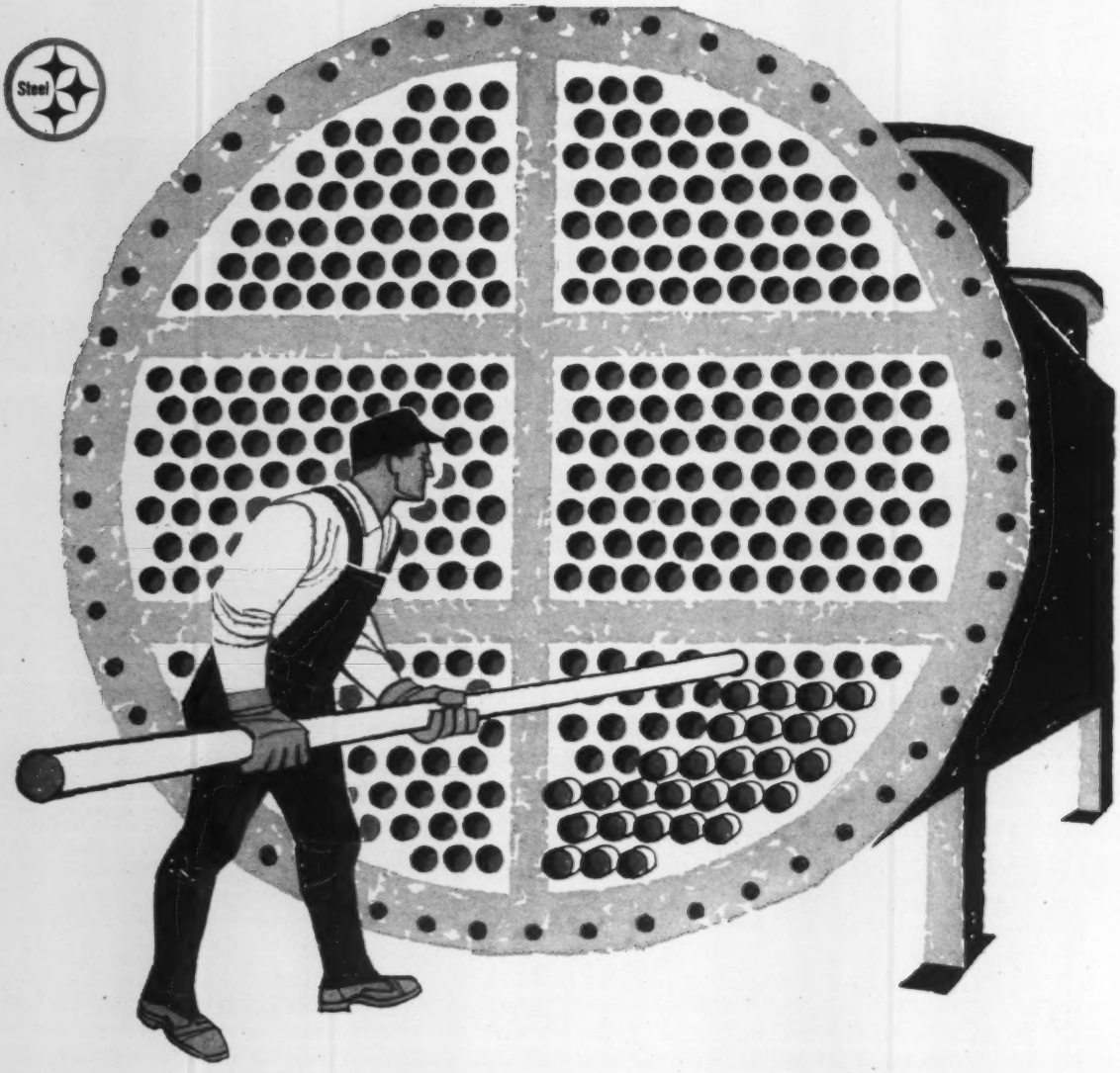
Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____

ARMCO **Armco Division**



How to prevent corrosion when the pressure's on

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The Babcock & Wilcox Co., Tubular Products Div. ↓↑
The Carpenter Steel Co., Alloy Tube Div. ↑
Clayton Mark & Co. ↓
Jones & Laughlin Steel Corp., Electricweld Tube Div. ↓
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↑ PRODUCES WELDED STAINLESS STEEL TUBE
↓ PRODUCES WELDED CARBON STEEL TUBE

361

Hundreds of miles of welded steel tubing in various stainless analyses are being used in heat transfer equipment in the process industries . . . proving its dependability.

Welded stainless steel pipe also has proved its economy and dependability. It is readily available in Schedules 40S, 10S and 5S from manufacturers stocks and local Steel Service Centers.

You can get the assurance of stainless tubing and pipe that meets high domestic standards from the quality stainless producers listed at the left. It will pay you in precision as well as in cost cutting, corrosion-killing reassurance to get information about stainless steel welded tubing from any of them. Or you can write to Department ST-2, Welded Steel Tube Institute, Inc., Hanna Building, Cleveland 15, Ohio.

WELDED STEEL TUBE INSTITUTE, INC.

Doing What Comes Unnaturally

Ever try to persuade someone to goof up deliberately? Machine Tool Editor Bob Huber had that task. He wanted to do a story on common machining mistakes, with pictures to illustrate his points.

The pictures were the problem. Bob enlisted the aid of Jordan D. Wood, manager of marketing services at Jones & Lamson Machine Co. Here's part of Joe Wood's letter telling of his difficulties.

"It wasn't easy. I had a devil of a time persuading two of our best operators to do some of the things you see (above, on the cover, and on Pages 96-99). They are both apprehensive about being saddled with a poor reputation by anyone who sees them in these photos. However, I finally reassured them."

We also reassure them. It takes someone good to foul up on purpose. We think the operator pictured above (we are honoring his request to be anonymous) has the makings of a fine actor too. Have you ever seen a more realistic expression of disgust?

Rebuttal

The mail concerning News Editor Bill Dean's article, "Assistants to: What's Their Role?" (Jan. 30, p. 64), has been lively.

Here's a sample from a former assistant to, James E. Kuhns, who is now vice president, manufacturing, for Kuhns Bros. Co., a Dayton, Ohio, foundry:

"A good assistant to should have the same qualities as a good manager. Why call him an assistant to somebody?

"If a busy executive has too many problems to handle and wants someone to check the morning mail, answer telephone calls, keep tabs on meetings, meet people, read newspapers and magazines for him, hire a secretary—male or female. That is secretarial work.

"If a troubleshooter or expert is needed, call in a consultant to work on the problems in a limited area. If it is a full time job, hire a manager or promote someone giving him a recognized title.

"To bring in an assistant to as a cover-up for a weak boss is apt to create another weak boss.

"If you want a manager, give him responsibility and commensurate authority as a manager. If you want a clerk or secretary, that's what you should hire."

Spring Fever

Spring doesn't officially begin until tomorrow, but the seasonal fever has already hit us.

We forgot to mention on Mar. 13 that an important event was occurring in Syracuse, N. Y., on Mar. 14. The Manufacturers Association of that city unveiled for top management a coordinated, in-plant educational program on economics.

As part of the association's plan to show what such programs can do, it reprinted our "Build a Better Business Climate" (Jan. 9, p. 37) where we reported how Racine, Wis., employers had tackled a similar project.

Last week we forgot something else, even closer to home. A new editorial writer had joined Irwin Such, vice president-editorial, and Walt Campbell, editor. Associate Managing Editor John Morgan will be presenting his views about once a month from now on.

When John first joined STEEL in 1946, one of his first assignments was to keep the readers up to date with our Calendar of Meetings. His first editorial dealt with a related subject, meetings—and how to have a successful one. More recently, he has been occupied with labor, depreciation, and pricing articles. We bet you'll be hearing from him on those subjects.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

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. . . Fluid Power news

OILGEAR 40 Years of Fluid Power

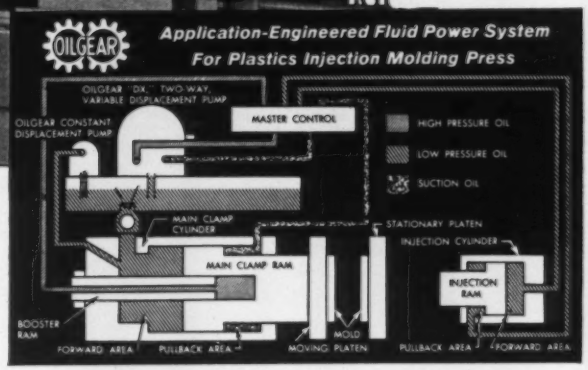
Report No. 11,602 From Oilgear *Application-Engineering* Files

HOW OILGEAR ENGINEERING TEAMWORK AIDED DESIGN OF NEW INJECTION MOLDING MACHINES

CUSTOMER: *National Automatic Tool Co., Inc. (NATCO), Richmond, Indiana*

DATA: As a preliminary guide to design and production of a new line of injection molding machines, "NATCO" engineers used a 31-question survey of molders operating eight or more machines. This survey confirmed "NATCO" engineers' experienced opinion that: 1. Most unplanned downtime on injection molding machines was due primarily to hydraulic system problems . . . shocks caused by sudden shifts in pressure or direction of flow through valves "under pressure," causing pipe and welded joint fatigue, bent valve stems, cracked or over-stressed tie-rods and cylinders. 2 Molders' demands for higher speeds and pressures further amplify these problems. *Basic "NATCO" Requirements:* 1. A hydraulic system to eliminate shock, hammering, and the resulting costly downtime . . . must provide continuous, dependable, high-speed operation. 2. Both slow and high-speed closing, as well as two-speed injection control for faster molding cycles. 3. High-speed clamp action. 4. Precision control of speeds and pressures to insure high molding quality. 5. Must be a "clean" package . . . compact, leak-free, simple to install, fast and easy to maintain, quiet, conserve electrical power.

New "NATCO 400" Plastics Injection Molding Machine — one of four standard sizes. Note overhead position of the Oilgear pump and reservoir . . . away from dirt and molding-room traffic. This position permits fast gravity flow of oil from the reservoir through a prefill valve into the large clamp cylinder to speed operation. During the past year . . . a period of unusually low capital investment purchases . . . over 150 Oilgear Pumps have been put into operation on this new "NATCO" line.



Simplified schematic illustrates one phase of system operation — high-speed closing of clamp ram. Large clamp cylinder is being gravity-filled through prefill valve, while mold clamp is being advanced by small booster cylinder powered by Oilgear "DX" pump. Closing speed — 700 in./min. This circuit design provides clamp pressure build-up in a fraction of a second . . . one of the reasons for the fast cycles on the "NATCO 400."

SOLUTION: Cooperation and teamwork between "NATCO" and Oilgear engineers resulted in a new, shockless, *Fluid Power* System . . . basis of a revolutionary new line of high-speed, high-capacity, plastics injection molding machines. This system incorporates two Oilgear Pumps . . . one, a large capacity, radial piston, two-way, variable displacement type "DX" pump with remote electric control which alternately serves the mold clamp and injection rams; and a small capacity, constant displacement type "HG" pump which maintains a high, positive clamping force during injection cycle. Instead of using conventional valves "under pressure" to reverse clamp and injection rams, these functions are accomplished by reversing fluid flow in the Oilgear type "DX" pump. With this system, flow and pressure decelerates to zero *before* flow direction is changed . . . flow then accelerates to a preselected volume in the new direction — completely eliminating reversal shocks. No chokes or other controls on the master valve are necessary, as diverting of flow from clamp to injection rams is also made under ideal "no-flow" conditions, with absolutely no shock. Infinitely variable machine speeds are obtained by varying pump stroke, resulting in a minimum of heating and horsepower dissipation.

For similar practical solutions to YOUR linear or rotary Controlled-Motion problems, call the factory-trained Oilgear Application-Engineer in your vicinity. Or write, stating your specific requirements, directly to . . .

"NATCO," famous in machine tool and plastic molding machine fields, states — "*Although lower priced pumps could be secured, they basically did not offer the control features found in the Oilgear units. This is especially true of the larger capacity pump, which in addition to its variable and reversible features incorporates many auxiliary controls. It's more than just a pump . . . it contains auxiliary systems for pilot, supercharge, cooling, safety, and filtering. These pumps are quiet. They have an excellent injection molding machine service record . . .*"

THE OILGEAR COMPANY

Application-Engineered Controlled Motion Systems

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N-A-XTRA

HIGH-STRENGTH STEEL

TO CUT DEAD WEIGHT AND STRETCH PAYLOAD CAPACITY

This Lectra Haul M-55, made by Unit Rig and Equipment Co. of Tulsa, is now working in the open pit iron mines in Minnesota's Mesabi range. In bone-freezing —40° weather, it can stand up to the shuddering shock of 55 tons of drop-loaded iron ore, climb a 6% grade at 8.6 mph then dump those 55 tons in a crashing, grinding 18 seconds. The quarry body that takes this loading impact and dumping abrasion in sub-zero temperatures is made of N-A-XTRA high-strength steel, with X-A-R Abrasion Resistant Steel for extra hardness and toughness in wear areas. N-A-XTRA also forms the structural members of the complete unit.

Why N-A-XTRA? Because, pound for pound, it's nearly three times stronger than ordinary steel. That means it's strong enough to absorb severe punishment without constant maintenance, and light enough to handle the highest possible payload. In fact, the Lectra Haul payload is almost as much as the net vehicle weight itself.

N-A-XTRA and X-A-R are doing the job where only the strongest steels will do. Easily formed and welded, they are making products stronger, lighter, longer lasting. N-A-XTRA fully quenched and tempered steel is available in four levels of minimum yield strengths, from 80,000 to 110,000 psi. X-A-R steels are supplied in hardnesses from 360 to 400 BHN (or, by agreement, in a range between 265 and 500 Brinell). For full technical information, write Great Lakes Steel Corporation, Product Development, Dept. S-1, P.O. Box 7310, Detroit 2, Michigan.

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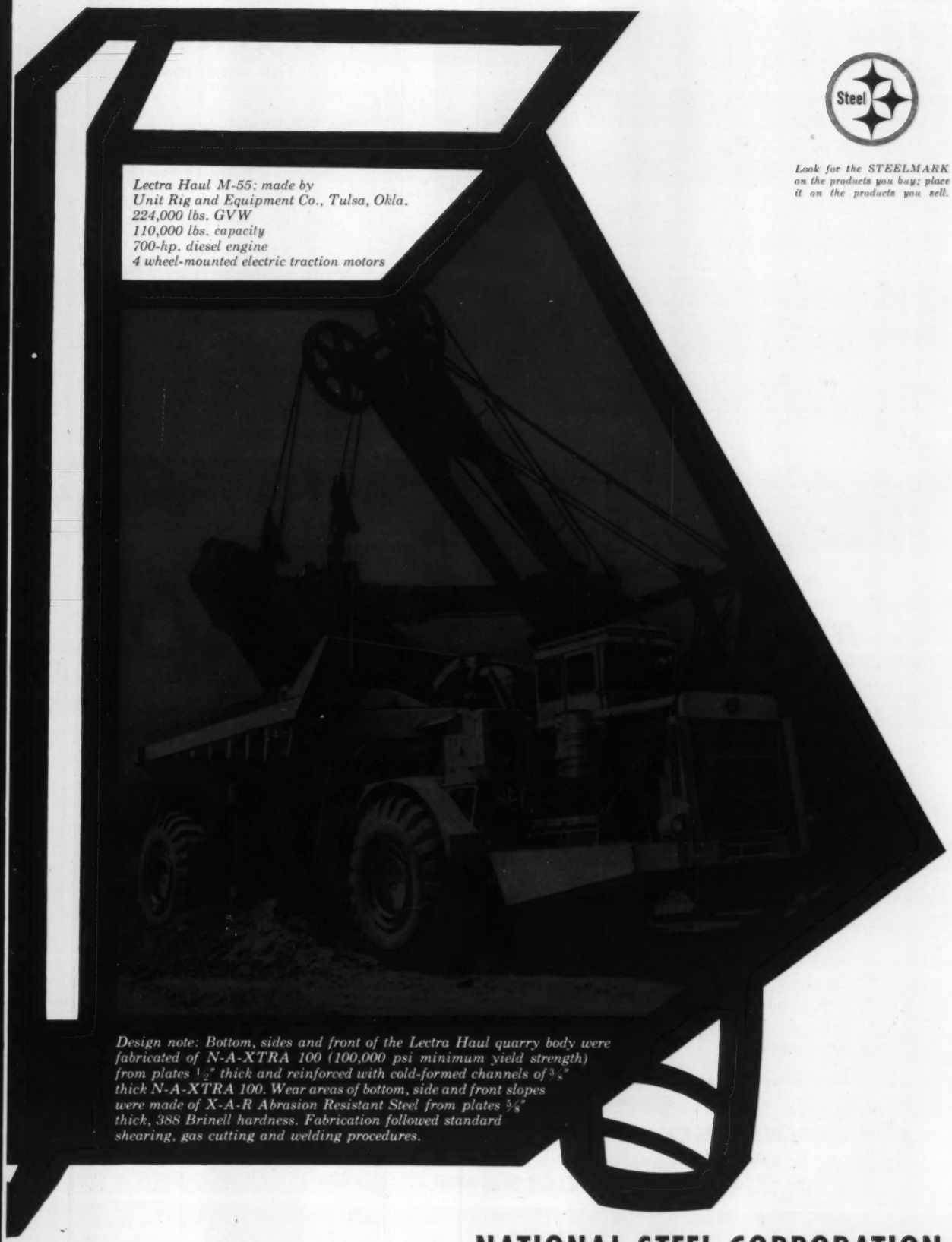

Lectra Haul M-55; made by
Unit Rig and Equipment Co., Tulsa, Okla.
224,000 lbs. GVW
110,000 lbs. capacity
700-hp. diesel engine
4 wheel-mounted electric traction motors

Design note: Bottom, sides and front of the Lectra Haul quarry body were fabricated of N-A-XTRA 100 (100,000 psi minimum yield strength) from plates ½" thick and reinforced with cold-formed channels of ¾" thick N-A-XTRA 100. Wear areas of bottom, side and front slopes were made of X-A-R Abrasion Resistant Steel from plates ⅜" thick, 388 Brinell hardness. Fabrication followed standard shearing, gas cutting and welding procedures.

Steel

Look for the STEELMARK on the products you buy; place it on the products you sell.

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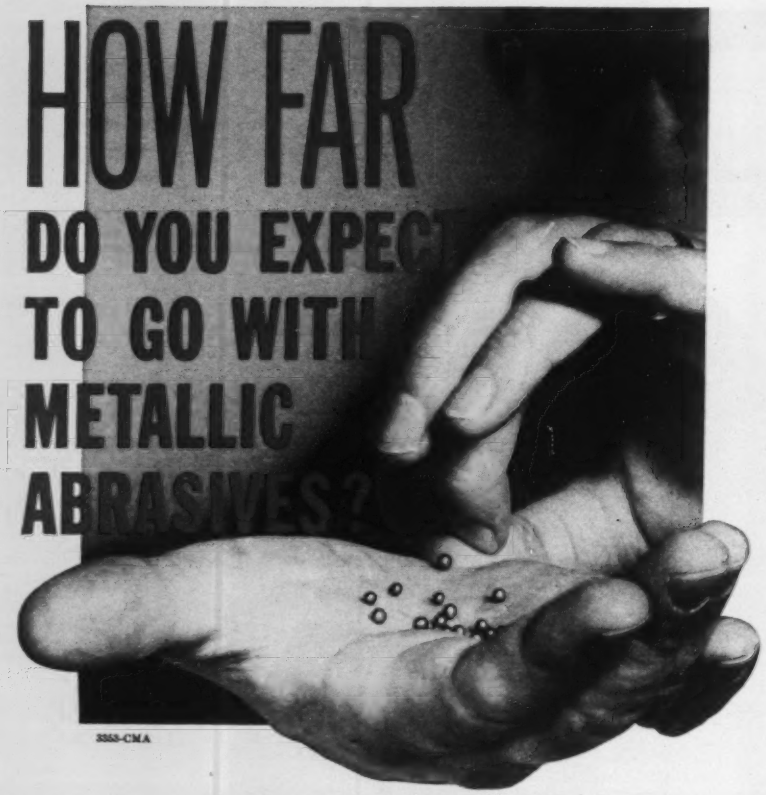

. . . maybe not far enough!

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CMA's Counselman Service is made up of men who *know* your industry. They are specialists with long experience in such fields as steel mills, foundries, enameling plants, and forge shops. They provide a technological service extension of CMA's research, development, manufacturing facilities and experience to *help keep users of metallic abrasives on the right track* . . . to explain factually how metallic abrasives can be more widely utilized for even greater advantages.

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CALENDAR
OF MEETINGS

Mar. 27-31, Fourth Symposium on Temperature: Cosponsored by American Institute of Physics, Instrument Society of America, and National Bureau of Standards. Place: Veterans Memorial Building, Columbus, Ohio. Information: V. W. Sikora, ISA, 313 Sixth Ave., Pittsburgh 22, Pa.

Apr. 3-7, National Association of Manufacturers: Institute on industrial relations, Diplomat Hotel, Hollywood Beach, Fla. Association's address: 2 E. 48th St., New York 17, N. Y.

Apr. 18, Hoist Manufacturers Association: General meeting, Statler-Hilton Hotel, Detroit. Association's address: 1 Thomas Circle, Washington 5, D. C. Executive secretary: Joe H. Peritz.

Apr. 18-19, American Society of Tool and Manufacturing Engineers: Process planning seminar, Statler-Hilton Hotel, Cleveland. Society's address: 10700 Puritan, Detroit 38, Mich. Chairman of the meeting: Nicholas J. Radell.

Apr. 20-21, National Association of Sheet Metal Distributors: Spring meeting, Sheraton-Cleveland Hotel, Cleveland. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Apr. 23-27, Scientific Apparatus Makers Association: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 20 N. Wacker Dr., Chicago 6, Ill. Executive vice president: Kenneth Andersen.

Apr. 23-27, The American Ceramic Society Inc.: Annual meeting, Royal York Hotel, Toronto, Ont. Society's address: 4055 N. High St., Columbus 14, Ohio. General secretary: Charles S. Pearce.

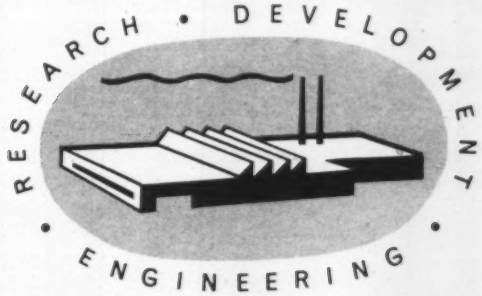
Apr. 24-25, International Acetylene Association: Annual meeting, Sheraton-Plaza Hotel, Boston. Association's address: 270 Park Ave., New York 17, N. Y. Secretary: L. G. Matthews.

Apr. 24-26, Association of Iron & Steel Engineers: Spring conference, Sheraton Hotel, St. Louis. Association's address: 1010 Empire Bldg., Pittsburgh 22, Pa. Managing director: T. J. Ess.

Apr. 24-27, Metal Powder Industries Federation: Annual meeting and show, Sheraton-Cleveland Hotel, Cleveland. Federation's address: 60 E. 42nd St., New York 17, N. Y. Executive secretary and treasurer: Kempton H. Roll.

Apr. 26-27, Metallurgical Society of AIME: Technical conference on high temperature materials, Pick-Carter Hotel, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: R. W. Shearman.

A new source of help for your manufacturing profits



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The same extensive research facilities that have produced the enviable chemistry of Simoniz products for over fifty years now have developments of significance to industry. The best of these are being made available through the new Industrial Products Division of Simoniz Company—Now, these better methods and materials can help you increase sales and reduce costs . . . Now, this complete facility for research and engineering is available to develop new materials for your specific needs. *Call or write for details of CLAD-REX Vinyl-Clad Metals . . . SIMONAIRE Foams and Industrial Chemicals . . . Simoniz Research, Development and Engineering.*

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GLadstone 1-2323

How Bob Clark increased

After getting his B.A. at Illinois College, Bay State Abrasive Specialist Robert M. Clark joined U.S. Steel where his work gave him a great deal of highly practical experience in metal-working problems. Since coming to Bay State in 1956, he has been in contact with just about every type of metal-working operation in the Chicago area and he's proven his skill by diagnosing and curing some unusual grinding shop ailments.

Getting a 20% increase in wheel life is a solid bonanza in any grinding operation, but there's more to this Bay State case history than that. It's an excellent example of the way careful analysis of the *whole* abrasive problem can pay *multiple* dividends.

It started with a simple test. Two unmarked Bay State diamond wheels were delivered to Cummins Engine Company, Inc., Columbus, Indiana, for a performance check against two competitors' wheels under standard shop conditions. Fifty-five days later the competition's wheels were completely used up. The Bay State wheels lasted 66 days.

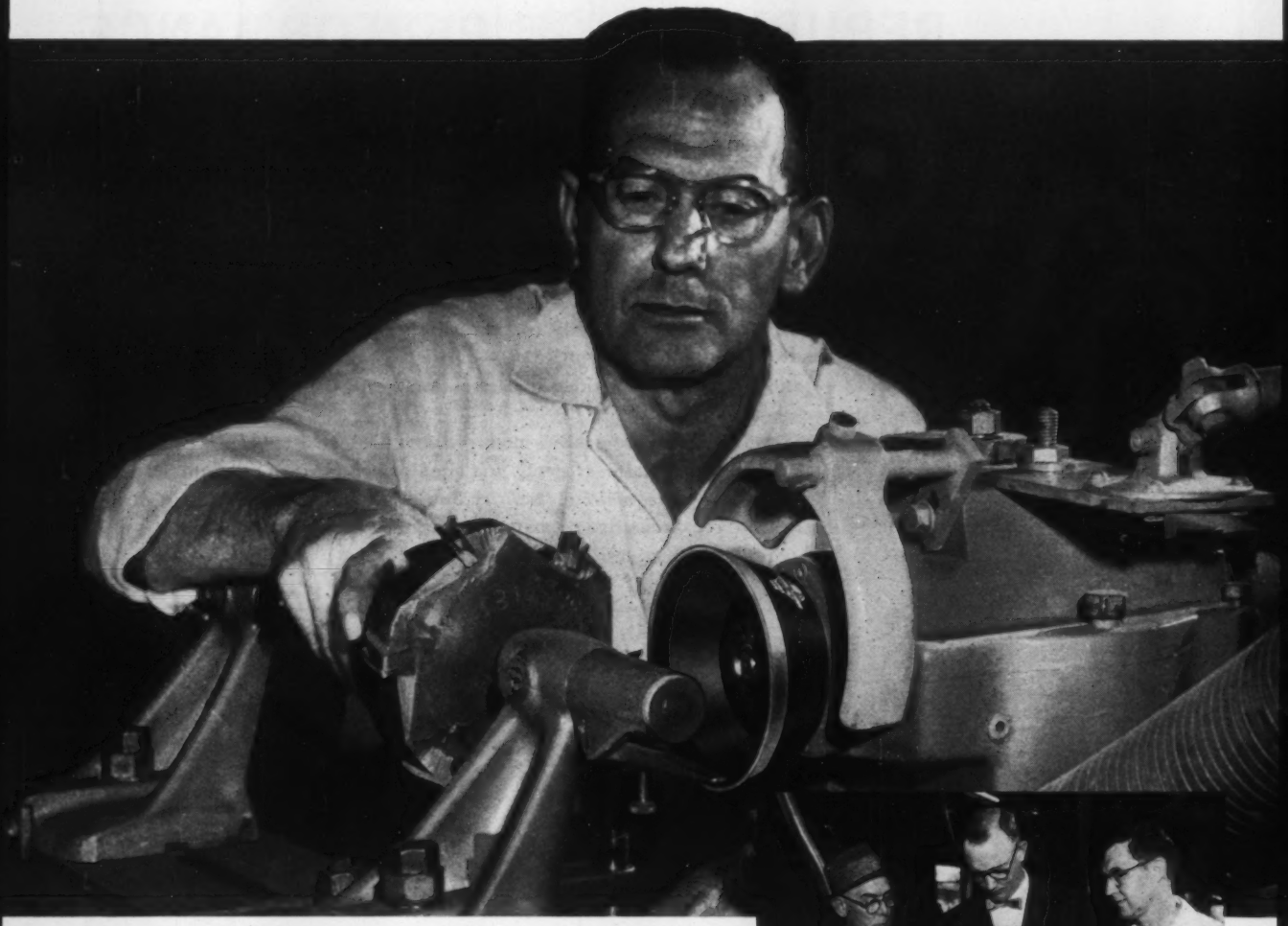
Since both types of wheels had been doing identically the same kind of work . . . and both carried exactly the same price tag . . . the 20% longer life of the Bay State wheels represented a solid cash saving.

On top of this, however, Bay State Abrasive Specialist Bob Clark found that wheels of 1/16" diamond depth could be used on certain jobs instead of the 1/8" depth wheels used in the test with an additional saving of $13,000 a year. And, finally, he worked out a new quantity-ordering system for Cummins that saved a further $1,824.00 annually and also insured against emergency shortages of wheels.

Bob Clark's outstanding thoroughness and demonstrated ability in this case have led to his being asked to survey all of Cummins diamond wheel applications and work out optimum wheel specifications for each job.

Diamond grinding is a highly specialized technique, of course, but even if your grinding operations call only for well-known standard specifications, there's an excellent chance that Bay State can give you improved performance. Why not call in your Bay State distributor or direct factory representative and put him to work? *Better grinding at lower cost . . . that is his business.*

diamond wheel life from 55 to 66 days at Cummins Engine Company, Inc.



▲ Operator Charles Adams prepares to make the first pass on a milling cutter with Bay State diamond cup wheel of 1/16" diamond depth. This is the actual specification that out-performed competing wheels by 20%.

Discussing the advantages of 1/16" diamond thickness wheel for specialized operations are (left to right): John Hedges, Supervisor of Tool Control at Cummins, Bay State Abrasive Specialist Bob Clark and Cummins Abrasive Investigator Robert Elliot. ▶

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

REPUBLIC HIGH-PERFORMANCE METALS FOR THE HU2K

Scheduled for fleet delivery in 1961, the all-weather Kaman HU2K "SEASPRITE" was developed to meet *high-performance* requirements of the U. S. Navy. Working closely with Kaman design engineers, Republic Steel is supplying light gage titanium and stainless steel for the HU2K.

Selected for its resistance to corrosion and abrasion, stainless is used in leading edges of the rotor blades. The titanium—Type RS140—is used in 1½″ x 18″ strips. Assembled in bundles of 88, these strips are machined into retention straps that are a vital component in the rotor system.

May we help you utilize *high-performance* metals in your project? Republic is the nation's largest producer of alloy and stainless steels, and a major producer of titanium. Republic has the most *extensive vacuum-melting facilities* ever assembled. For complete details, contact your Republic representative or mail the coupon.

REPUBLIC VACUUM-MELTED METALS are produced in 18- to 32-inch diameter ingots weighing from 4,000 to 20,000 pounds. Vacuum-melted super alloy steels, constructional alloy steels, high strength alloy steels, bearing steels, stainless steels, titanium, and special carbon steels are available from Republic in plates, billets, bars, sheets, strip, and wire. Mail coupon for complete information.

REPUBLIC PH STAINLESS STEELS . . . Republic PH 15-7 MO* for missiles and aircraft offers high ultimate tensile strength with excellent mechanical properties to 1000°F. Republic 17-4 PH* for shafts, gears, pins and other components requires only a one-hour heat treatment at 900°F to develop its full strength (ultimate tensile strength to 200,000 psi). Republic 17-7 PH* for pressure tanks, bellows, springs, and other applications provides better corrosion resistance than the hardenable grades of chromium stainless. Send for PH Stainless Steel Booklet.

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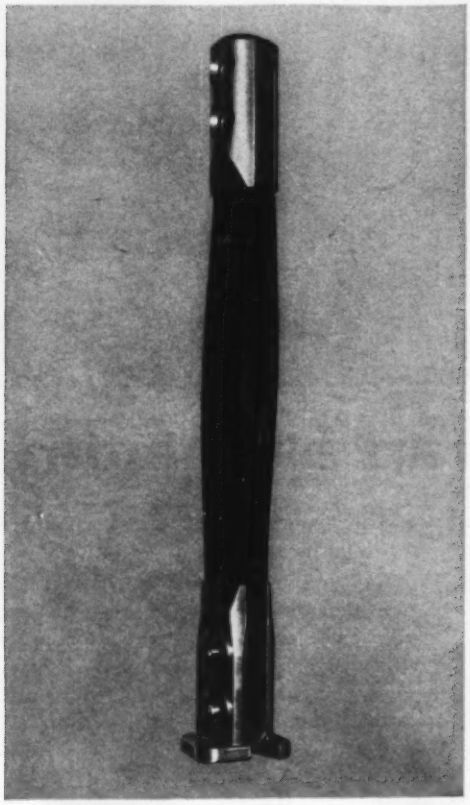

BUNDLED TITANIUM RETENTION STRAPS are designed to work through a torsion angle of ±13°. Each strap provides a minimum tensile strength of 155,000 psi. The HU2K "SEASPRITE" is manufactured by the Kaman Aircraft Corporation, Bloomfield, Connecticut.

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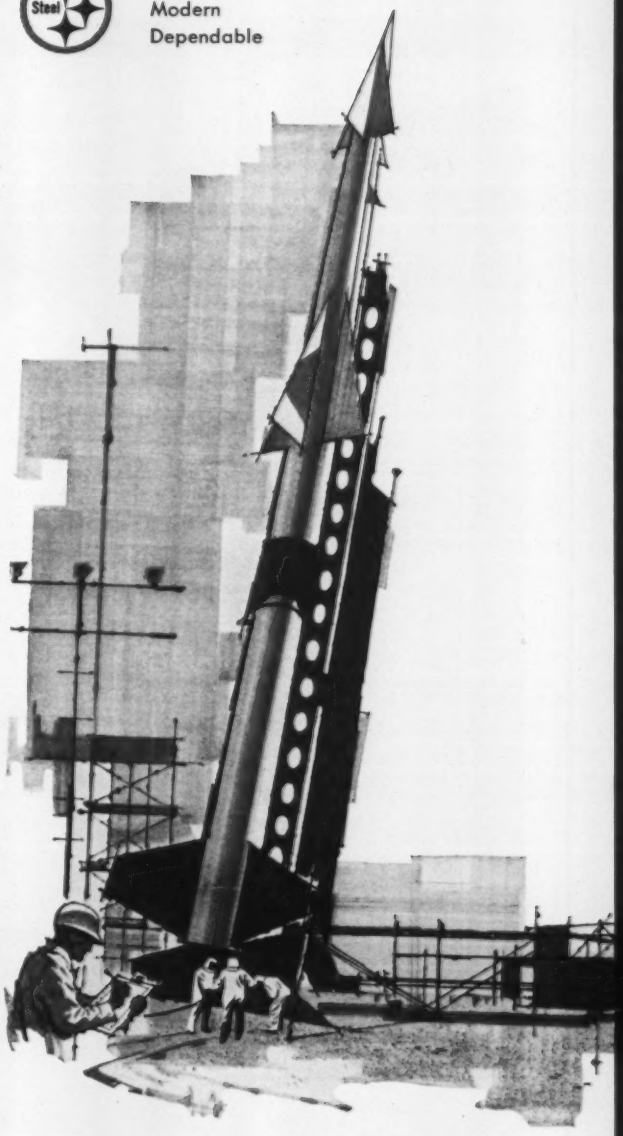

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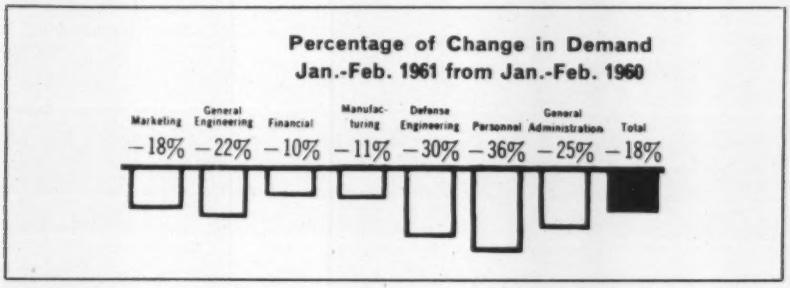
Metalworking Week®

March 20, 1961

Executive Demand Rises but Remains Low

Total demand for executives is 10 per cent higher than it was during the closing months of 1960, but it's still 18 per cent below the year-ago level (see bar chart below). That's the latest report from Heidrick & Struggles Inc., Chicago executive recruiting firm, which measures demand on the basis of display ads for executives. For most types of executives, demand in February, 1961, was the highest since April, 1960.



Engineer Demand Falls

Demand for engineers and scientists in January was below the level of 1960's final quarter and substantially below the level of January, 1961. That's the finding of the latest survey by Deutsch & Shea Inc., New York.

Goldberg Calms Fears on Strike Intervention

Many businessmen were understandably concerned about the degree to which the Kennedy administration would intervene in major labor disputes. When Labor Secretary Arthur Goldberg moved into the tugboat and flight engineer strikes, he raised the prospect that the White House would be eager to intervene in all major disputes. Now Mr. Goldberg is taking pains to make it clear that the administration has no such intentions. At a news conference, he volunteered to lay down guidelines. First, the dispute must be "grave." And it must be "in the national interest" to obtain a settlement rapidly. Second, it must be apparent that the established government mediation agencies have done all they can. Third, the administration will not "dragoon" either party into a settlement. Collective bargaining agreements must be reached voluntarily.

Government Files First Civil Suit Against Price Fixers

The Justice Department and the Tennessee Valley Authority have filed a joint civil suit in Philadelphia federal district court against General Electric, Westinghouse, Allis-Chalmers, Federal Pacific, and I-T-E Circuit Breaker. It's the first government damage suit growing out of the electrical industry's price fixing case. The government charges that TVA was forced to pay about 66 per cent more than it should have for large circuit breakers pur-

Technical Outlook—Page 95 Market Outlook—Page 131

chased from the five firms in the last ten years. Look for subsequent suits to be filed in behalf of the Bureau of Reclamation, the Bonneville Power Administration, the Army Corps of Engineers, the Atomic Energy Commission, and the Southwestern Power Administration.

Norge Unveils Commercial Thermoelectric Refrigerator

These two youngsters are cooling their soda pop with ice cubes made in a thermoelectric refrigerator. Norge Div. of Borg-Warner Corp. will supply 500 of these units (which have neither compressor nor refrigerant) to the Sheraton-Chicago Hotel, scheduled to open in May. It's the first such application for thermoelectric refrigeration and signals the probability of early introduction of luxury household units. Thermoelectric refrigerators for more specialized applications are being designed now.

Foreign Trade Declined in January

U. S. merchandise imports in January dropped to the lowest monthly volume since February, 1959. The Census Bureau says imports declined 3 per cent from the December level. That drop is not so great, however, as the 5 per cent considered normal between December and January. So the seasonally adjusted figure for January shows an increase over December, the first rise recorded since October. Earlier, the Census Bureau reported that U. S. merchandise exports in January declined a whopping 16 per cent from the December level to the lowest volume in 14 months.

How to Avoid Common Machining Miscues

You can probably improve the efficiency of nearly all your machining operations by 10 to 25 per cent simply by taking full advantage of machining technology. Experts contacted by STEEL say the industry is wasting a substantial portion of the $12 billion it spends annually to make metal chips. E. J. Krabacher of Cincinnati Milling Machine Co. says the extent of the gap between machining technology and machining practice is "surprising." For suggestions on how to avoid the most common mistakes and raise your efficiency, see Page 96.

Will Japan Trade with Red China?

The International Trade Promotion Association, an important Japanese export agency, has dispatched a delegation of men from 14 Japanese firms to Red China to evaluate the potentials of trading with the Communists. And

a prominent Japanese industrialist is in Washington "feeling out" the official U. S. reaction to any indicated resumption of trade between Japan and the Peiping government. The Japanese, faced with discriminatory trade barriers against their products in some export markets and rising pressure for such discrimination in still other markets, think the Peiping market might help to offset losses that arise from such barriers. Commercial transactions between Japan and Red China were disrupted in May, 1958. Japan has adhered since then to the Western policy of a trade embargo against Peiping.

North American Shows Compact Reactor

Compact nuclear reactors, like this full scale prototype, are being touted by Atomic International Div., North American Aviation Inc., to supply power in outer space, at ocean depths, and in special ground locations. The firm gave a demonstration of such possibilities to the Joint Congressional Committee on Atomic Energy. The unit exhibited is about the size of a bushel basket and weighs about 200 lb. North American is participating in the SNAP (systems for nuclear auxiliary power) program of the Atomic Energy Commission.

Here's Chance to Air Tariff Gripes

If import restrictions in foreign countries are causing export problems for you, here's your chance to be heard. The Committee on Reciprocity Information, Tariff Commission Bldg., Washington 25, D. C., invites your written statements on problems caused by import restrictions in Austria, Japan, Burma, Chile, Indonesia, Turkey, South Africa, Denmark, Finland, New Zealand, Norway, and Israel. Statements should be documented and detailed.

New Careers for Senior Managers

"I see no more reason why a man should continue doing the same thing after age 50 or 60 than I do his continuing as an adult what he did as an adolescent," says Ewing W. Reilley (photo) of McKinsey & Co. Mr. Reilley proposes a plan (see Page 66) whereby a manager can begin a new career at 55, 60, or 65. It might involve a different role within his own firm, or a responsibility in an entirely new field, such as education, social service, or government.

U. S. Steel Blasts Tax Rates

The government's "tax and regulatory powers can be used to destroy the incentive to save and productively invest which is essential to growth," U. S. Steel Corp. says in its annual report to stockholders. It continues: "To impair the save-invest process, it is only necessary to provide that to each increment of larger incomes a progressively greater tax rate shall apply. Through mounting taxation, we have virtually destroyed the incentive of those most able to promote the nation's growth and seriously impaired that of those

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possessed of lesser but substantial ability to do so." The nation's biggest steelmaker reported 1960 sales of $3,698,500,000 and earnings of $304 million (vs. 1959 sales of $3,643,000,000 and earnings of $254 million).

Group Urges Wider Latitude for President

A new Senate Commerce Committee staff study urges that the President be given power to negotiate broader tariff reductions and to seek wider trade agreements with Russia and other Communist bloc nations. The Kennedy administration would like those powers, but probably won't push too hard for them if considerable Congressional resistance looms.

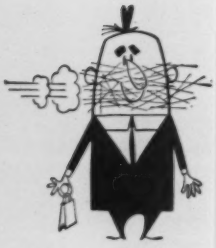
UN Will Sponsor Conference on New Energy Sources

The United Nations will sponsor a conference on new sources of energy (Aug. 21-31) in Rome. It will consider practical problems and experiences in using solar energy, geothermal energy, and wind power. Special emphasis will be given to ideas for using new power sources in underdeveloped countries.

Crucible Calls for End to Wage-Price Spiral

Crucible Steel Co. of America, in its annual report, says the steel industry "may have seen the end of the pattern of leapfrogging steel wages and prices" because fierce competition and excess capacity are preventing boosts even when steel wages go up. "Unless a way can be found to slow down the steady rise in employment costs . . . the whole economy must face a grave situation," the report continues.

Straws in the Wind



It won't be long before the economy "turns the corner" to recovery, says Prof. Paul McCracken of the University of Michigan. He thinks a tax cut would help more than government spending programs . . . The Air Force reports development of a new class of titanium alloys with good strength at high temperatures . . . Consolidated Coal Co. and Texas Eastern Transmission Corp. have formed a partnership which may build a coal pipeline from West Virginia to serve utilities in New York, New Jersey, and Pennsylvania . . . Production workers at C. M. Hall Lamp Co., Detroit, have taken a 17 cents an hour pay cut to keep the plant from moving . . . James M. Straub, president, Fort Pitt Bridge Works, Pittsburgh, and head of the American Institute of Steel Construction Inc., died Mar. 14.

Metalworking Pulse

The Business Trend: STEEL's industrial production index crept up 1 point in the week ended Mar. 11 as freight carloadings rose with the temperature. **Autos:** Production will slump below the comparable period of 1958 as the Big Three lay off workers because of mounting inventories and continued apathy of consumers. **Steel:** Ingot output continues to slip.

- **INDUSTRIAL PRODUCTION INDEX**
  (1947-49=100)
  Week ended Mar. 11 . . . **147†**
  Year ago **178**
  Details on Page 81
- **PASSENGER CAR OUTPUT (UNITS)**
  Week ended Mar. 18 . **70,000***
  Year ago **145,852**
  Details on Page 78
- **STEEL INGOT OUTPUT (TONS)**
  Week ended Mar. 18 **1,570,000***
  Week ago **1,573,000**
  Details on Page 140

†Preliminary. *Estimated.

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MODERN PROCESSING

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Your Steel Service Center serves you in all these ways

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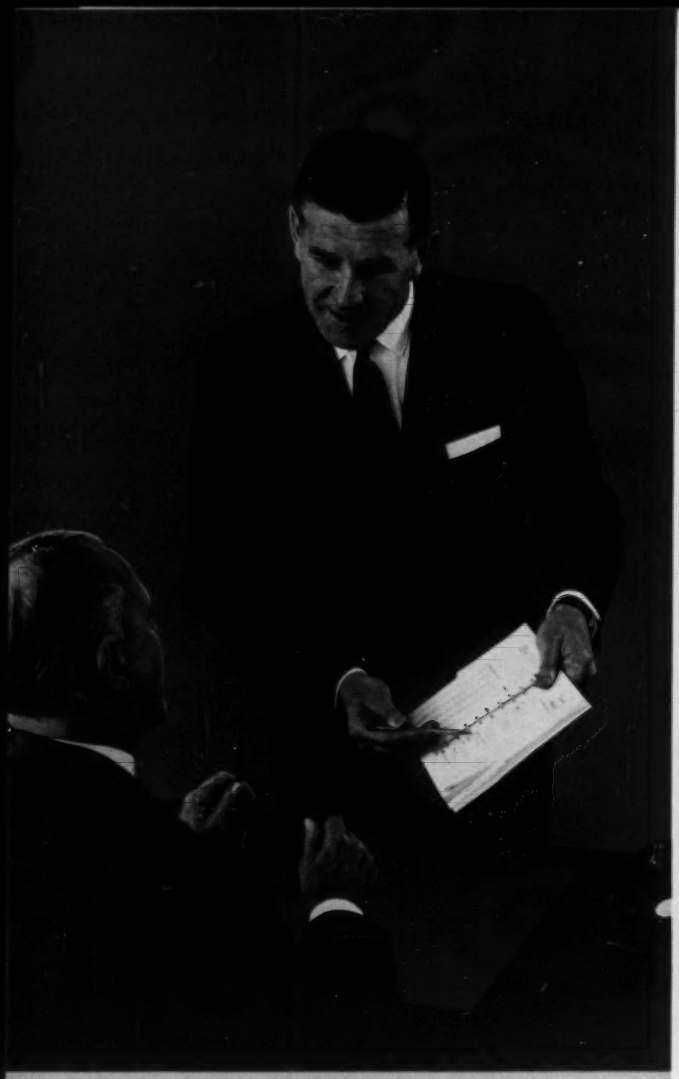

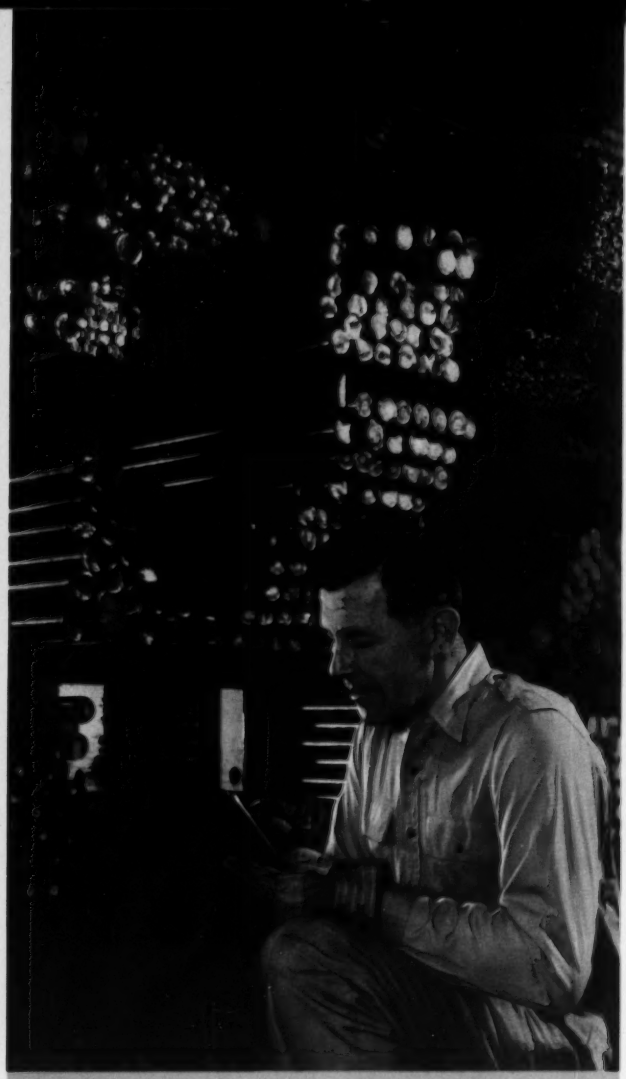

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Your Steel Service Center representative will advise you on the selection, fabrication, and application of steel. He is trained for the job. He offers a vast fund of technical experience gained through close cooperation with manufacturers on a great variety of steel application problems.

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Steel Service Centers select their steel stocks to meet the needs of the areas they serve. They store your steel for you. You reduce your inventory costs, release tied-up capital, reclaim storage space for more productive use. And you get the right steel when you need it.

Call your Steel Service Center for the right steel... delivered quickly from stock, ready for use

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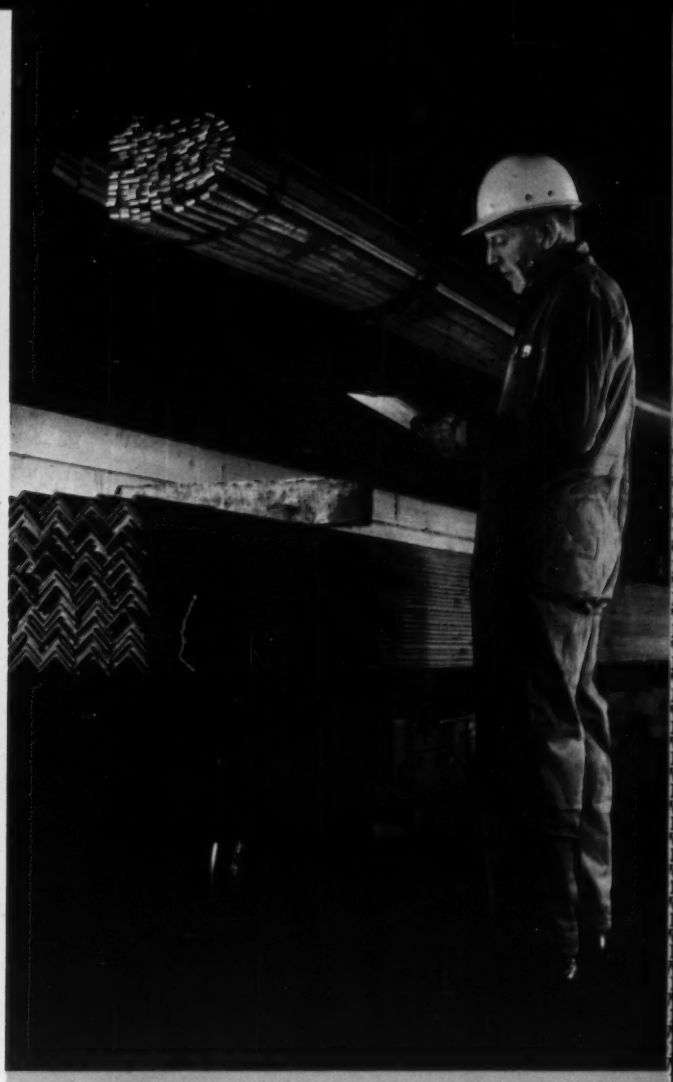

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Your Steel Service Center representative is a good man to get acquainted with. He knows steel . . . and what can be done with it. He can draw freely on a staff of technical experts. He's set up to handle your steel needs—especially if you need steel fast, if you need steel only occasionally, or if you need steel in limited quantities.

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Steel

for strength
...economy
...versatility

BETHLEHEM STEEL

HOW TO FIGURE YOUR REAL COST OF POSSESSION FOR STEEL

Insert figures for each cost in appropriate spaces. The resulting totals will give you a true comparison between the "price for inventoried steel" and the cost of buying it from your Steel Service Center.

COST OF POSSESSION FOR STEEL IN INVENTORY

Per ton delivered _____

Cost of capital:
- Inventory _____
- Space _____
- Equipment _____

Cost of operation:
- Space _____
- Materials handling _____
- Cutting and burning _____
- Scrap and wastage _____

Obsolescence _____
Insurance _____
Taxes _____

TOTAL _____

COST OF FREEDOM-FROM-RISK STEEL FROM YOUR STEEL SERVICE CENTER

Per ton, cut-to-size, and delivered

TOTAL _____

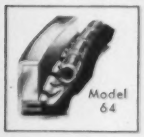
ENGINEERED OIL SEALS
for Steel Mills

In severest atmospheres, Garlock KLOZURE* Oil Seals protect bearings from dirt, dust, lubrication leakage. Model 63 illustrated at right is a general purpose seal for shafts up to 3″ diameter.

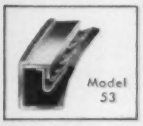
Where there is the slightest possibility of bearing damage due to oil leakage, apply Garlock KLOZURE Oil Seals.

Everywhere in steel—on hot and cold strip mills, blooming and structural mills—Garlock KLOZURE Oil Seals prevent leakage of vital bearing lubrication. And they further prevent damage to the bearings by sealing out scale, spray, dirt, and other foreign matter.

For example, Model 142, a face-type oil seal, is designed to seal surfaces perpendicular to shaft . . . keeps water splash and scale out of bearings at the shoulder of mill rolls. Models 64 and 82 are applied



to large shafts at normal or high speeds . . . ideal for protecting bearings on back-up and work rolls. Model 53 withstands temperatures up to 250°F at normal or high speeds . . . recommended for table rolls. Where equipment can't be dismantled easily, Model 23 Split-KLOZURES are the choice.



All KLOZURE Oil Seals are oil and grease resistant . . . impervious to water, mild acids, alkalies . . . non-abrasive . . . withstand temperatures from −40°F to +250°F. For extreme conditions, Garlock furnishes sealing elements resistant to practically any fluid, and serviceable as high as +500°F.

Enjoy prompt "off-the-shelf" delivery. A new, nationwide stocking program places over 1800 standard stock items of Garlock KLOZURE Oil Seals near you. All you need is a telephone for quick service on a badly-needed replacement oil seal, or to replenish your current stock of seals. For the name and address of the authorized Garlock KLOZURE Oil Seal distributor in your area, call the closest of the 26 Garlock sales offices and warehouses

GARLOCK

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Canadian Div.: Garlock of Canada Ltd.

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Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

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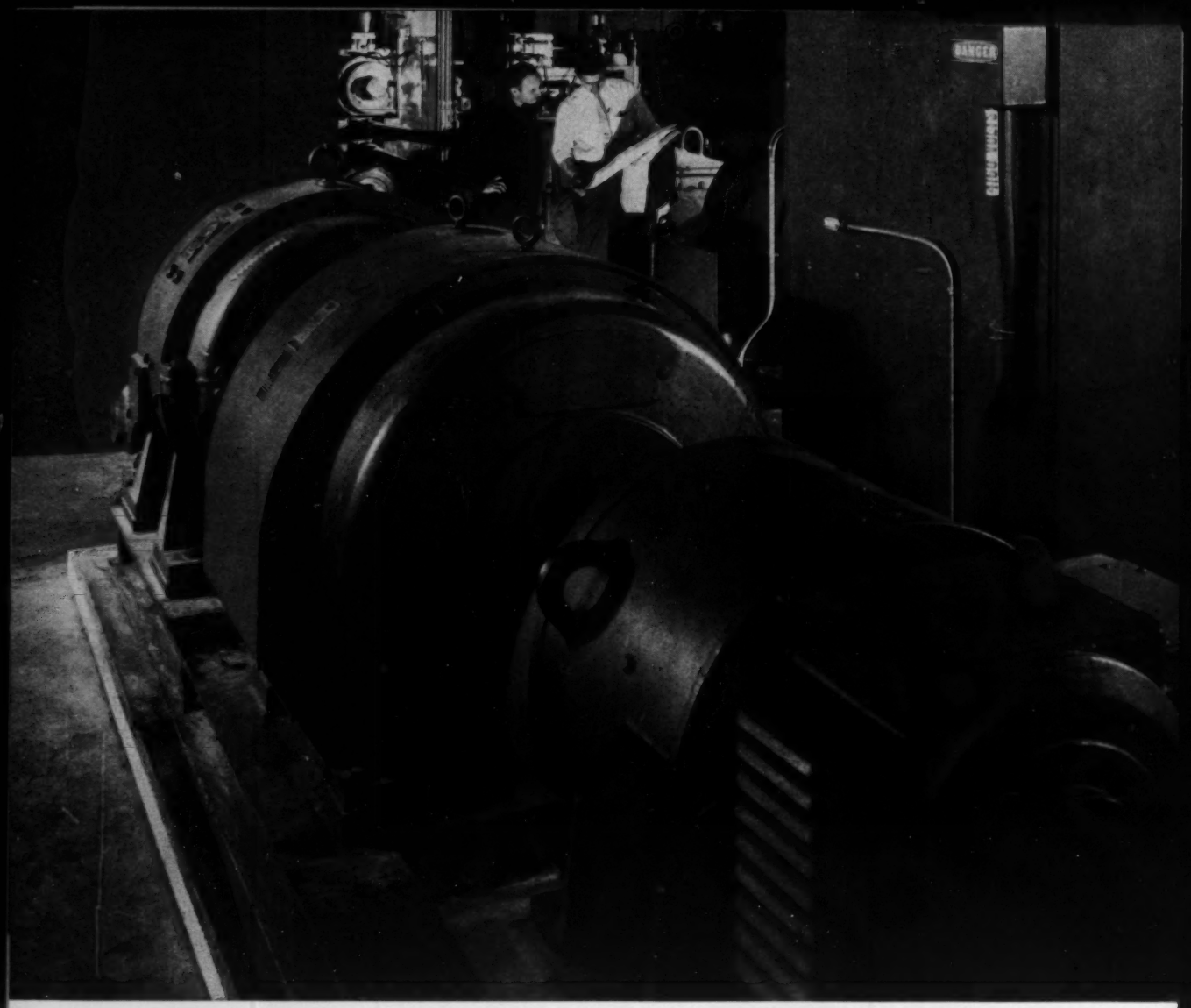

RELIANCE SYSTEMS ENGINEERS SOLVED THE PROBLEM BEFORE THE ANSWER WAS BUILT

It works precisely, as they said it would.

What you see is the source of D-c. power for a dual-purpose cold mill . . . Reliance motors, generators and mill controls. What you don't see, but what the customer gets, is extreme accuracy and smooth, economical operation, from Reliance Systems Engineering.

The cold mill itself uses four rolls for cold reducing . . . two rolls for tempering and finishing. A 250 hp. Reliance D-c. motor powers the mill and can be quickly coupled to either set of rolls, depending on the operation selected. Utilization of full motor speed range produces a maximum of 300 feet per minute on 8″ or 20″ rolls. The reel is driven by a 100 hp. D-c. motor with two VSR regulators, one to match the speed of the mill—the other to maintain tension. Reliance Engineers determined the *right* regulators to use and *how* to use them, saving this customer equipment and operating costs.

Reliance Systems Engineers can apply their talents to your systems operations—in advance—give you the thinking and the products that do the job you want and need. Can we help you?

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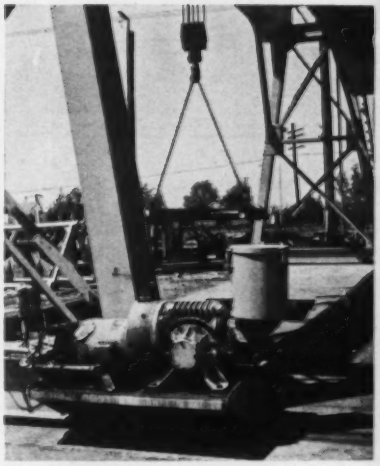
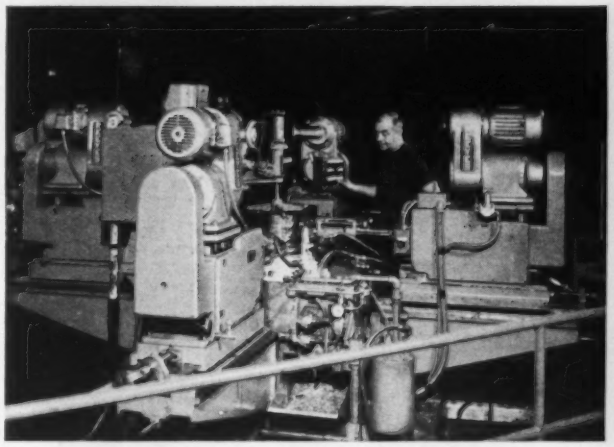
A-1682

ONE SELF-CONTAINED, COMPACT POWER PACKAGE. This MASTER GEARMOTOR has been operating outdoors for 5 years regardless of weather. It has no exposed high speed couplings, no V-belts, chains or sprockets. Engineering and assembly costs are reduced. You can simplify installations and save space with vertical, horizontal and flange mountings; output shaft over, under, left or right. Ratings 1/8 to 125 hp. in right angle, parallel or in combination. Right angle ratios are available in 96:1; parallel 120:1. Bulletin E-2409.



CONTOUR EPOXY-COATED TO ELIMINATE ENCAPSULATION CRACKING. New RELIANCE ENCAPSULATED MOTOR . . . gives you positive protection from dust, dirt, acid and water. Unlike other heavy molded coatings, stator windings are vacuum-impregnated with epoxy resin at a uniform thickness, follow the contour of the windings. You get maximum flexibility, tensile and bond strength, plus quicker cooling . . . all vital to superior motor performance. Bulletin B-2108.

INFINITELY VARIABLE OUTPUT SPEEDS AT LOW COST. REEVES MOTODRIVES, shown here powering this 4-position drilling and boring machine, are used extensively for hundreds of production needs. Horsepower ratings from ¼ to 40, speeds from 1.71 to 4660 rpm. Speed variation ranges from 2:1 to 10:1. Available in hundreds of space-saving assemblies . . . with manual, remote or automatic process control (Airtrol). Bulletin M-592.

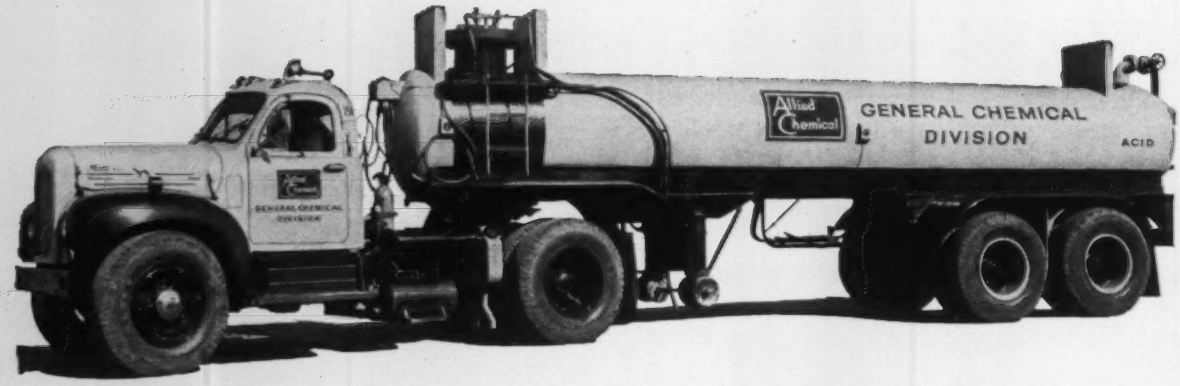


TOTAL SERVICE is an integral part of every Reliance product, from engineering and start-up assistance to maintenance and renewal parts. The photo shown here is typical of a Reliance Service Engineer's on-the-job availability—for maintenance and consultation on knotty problems. Every Reliance Sales Engineering Office and Distribution Center—nationwide—gives you the attention and experience necessary to assure the top performance you expect from the Reliance equipment you buy.

RELIANCE ELECTRIC AND ENGINEERING CO.

DEPT. 43A, CLEVELAND 17, OHIO • Canadian Division: Toronto, Ont.

Now... HF by Tank-Transport Delivery



Introduced by General Chemical ...The Nation's Leading HF Producer

PRODUCING PLANTS
(Anhydrous and Aqueous)
North Claymont, Delaware
Nitro, West Virginia
Baton Rouge, Louisiana

BULK STATIONS
(Aqueous HF, 70% only)
Pittsburgh, Pa.
Chicago, Ill.
Los Angeles, Calif.
Buffalo, N.Y.
Cleveland, Ohio

The convenience and flexibility of tank-transport delivery of Hydrofluoric Acid is now being provided by General Chemical.

This new country-wide service is being introduced with a fleet of special tank transports, each with capacity of approximately 3000 gallons (15 net tons).

Aqueous Hydrofluoric Acid, 70%, is offered for immediate delivery. Similar deliveries of Anhydrous HF can also be made available, and we welcome the opportunity to discuss your individual requirements.

For full information on this new HF service, call your nearest General Chemical office.

Basic to America's Progress

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

New slanted "full-vision" cowl that makes load pick-up unusually fast and easy, is an outstanding feature of Towmotor Stream-Liner Series fork lift trucks (above). Load capacities, 3000 to 5000 lbs. Diagram below shows how operator is able to see within 12" of the heel of forks.

TOWMOTOR'S ON THE MOVE

—in more plants, in more ways, with more money-making features. On the move, handling more materials, gaining lost storage, speeding distribution. On the move, raising productivity, lowering costs, increasing profits. Get going with Towmotor fork lift trucks and carriers—made only by TOWMOTOR CORPORATION, CLEVELAND 12, OHIO.

TOWMOTOR
THE ONE-MAN-GANG®

SCIAKY...
FIRST IN ELECTRON BEAM WELDING

Advanced Sciaky Design Combines Research and Production Capabilities into One Machine

If *you're* interested in electron beam welding, here's why you should investigate Sciaky machines:

SCIAKY ELECTRON GUN DESIGN...

Simple, rugged and compact! Exceptional electron optics produce beam density previously possible *only* with accelerating potentials as high as 100,000 v. The Sciaky gun, entirely contained within the atmosphere of the welding chamber, will operate in any angular position. *Both* gun and fixture can be moved to any position within the chamber while welding. Advanced focusing design results in welds with 12 to 1 depth to width characteristics.

SCIAKY PUMPING SYSTEM...

Fast and efficient! Depending on chamber, only 3 to 10 minutes are needed to evacuate chamber to welding pressure. Pumping sequence is *completely* automatic with built-in safety devices.

SCIAKY SAFETY...

Unmatched! Low voltage (30,000 v. maximum) and highly refined chamber design eliminates x-ray hazards, which are a severe problem with higher voltage equipment. No costly shielding is needed.

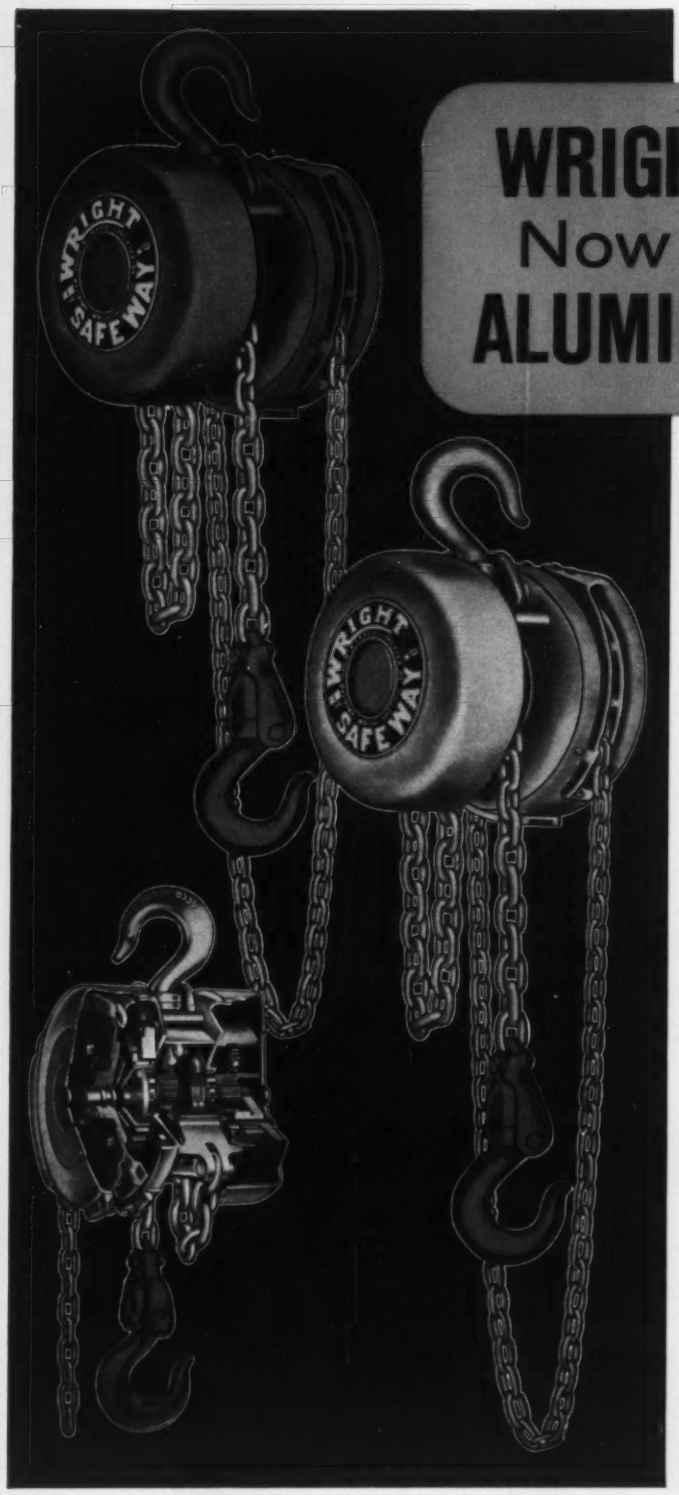
Call or write for details of these and other Sciaky machine features. Regardless of your specific area of interest, you'll find Sciaky's combination of extensive welding experience and advanced electron beam technology to be helpful.

Sciaky is Exclusive Licensee under the Stohr U. S. Patent 2,932,720 80C6102

You can learn more about Sciaky Electron Beam Welding, fully automatic TIG and MIG Welding with modular or building block concept, and the newest in Bench Welding at the

A.W.S. Welding Show, New York Coliseum, April 18, 19, 20,
Booth 729

SCIAKY BROS., INC., 4909 WEST 67th STREET, CHICAGO 38, ILLINOIS • PORTSMOUTH 7-5600



WRIGHT SAFEWAYS
Now Available in
ALUMINUM or STEEL

• Take the finest hand hoist ever made for simplicity of design and sturdiness of construction...add to it new external and internal parts of aluminum...and you have the WRIGHT Aluminum Safeway Hand Hoist. This hoist is made lighter and more easily portable, yet retains all the advantages of the original Safeway design. It features load-bearing parts of strong, shock-resistant steel. Aluminum replaces the heavy steel covers, chain guide and hand chain.

It is a self-lubricating hoist which keeps load chain, load wheel and gear train operating smoothly at all times. Gear train is enclosed in grease-tight chamber and stays lubricated for life. Load chain and load wheel are lubricated by wick-type oiler fed from refillable reservoir.

Two factory tests certify the accuracy, workmanship and rated load-carrying capacities of these new aluminum hoists. Every foot of load chain is proof-tested and every completed hoist is tested at 50% above rated capacity.

Available now in six models in a capacity range of ½ to 4 tons, WRIGHT Aluminum Safeway Hand Hoists offer these outstanding features:

GEAR TRAIN • Planetary system using modified involute stub tooth gear form with all gear teeth generated from solid steel blanks.

LOAD BRAKE • Weston type with uniform composition lining and silent pawl.

LOAD WHEEL • Ferrous alloy, reversible, with accurately formed pockets.

LOAD CHAIN • Electrically welded, has maximum wear resistance and ability to withstand extreme impact.

LOAD CHAIN GUIDE • Guides chain into load wheel and shrouds load sheave, protecting parts from falling dust.

BOTTOM HOOK • Nickel-chrome-molybdenum alloy steel. Rocks and swivels. Operates on a Timken thrust bearing.

Contact Your
WRIGHT DISTRIBUTOR

Or write our York, Pa., office for DH-164 and DH-345 which give complete information about WRIGHT Safeway Hand Hoists made from aluminum and steel. Find out the advantages they offer you.

WRIGHT HOISTS

ACCO

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Your final steel cost must include both

What goes into *final* cost of steel? Maybe more than you realize. After you know the initial price, figure the further costs of possession. Often hidden and unnecessary, they include the costs of storing, handling and readying your steel for use. Costs your steel service center can often help you reduce or eliminate—to keep your steel costs *low*.

Each steel user's case is different. Ask your steel service center to help you determine the most economical way to buy steel. They will give you a helpful guide for figuring all your costs of possession, such as:

Cost of capital:	Cost of operation:	Other costs:
Inventory	Space	Obsolescence
Space	Material handling	Insurance
Equipment	Cutting & burning	Taxes
	Scrap & wastage	Accounting

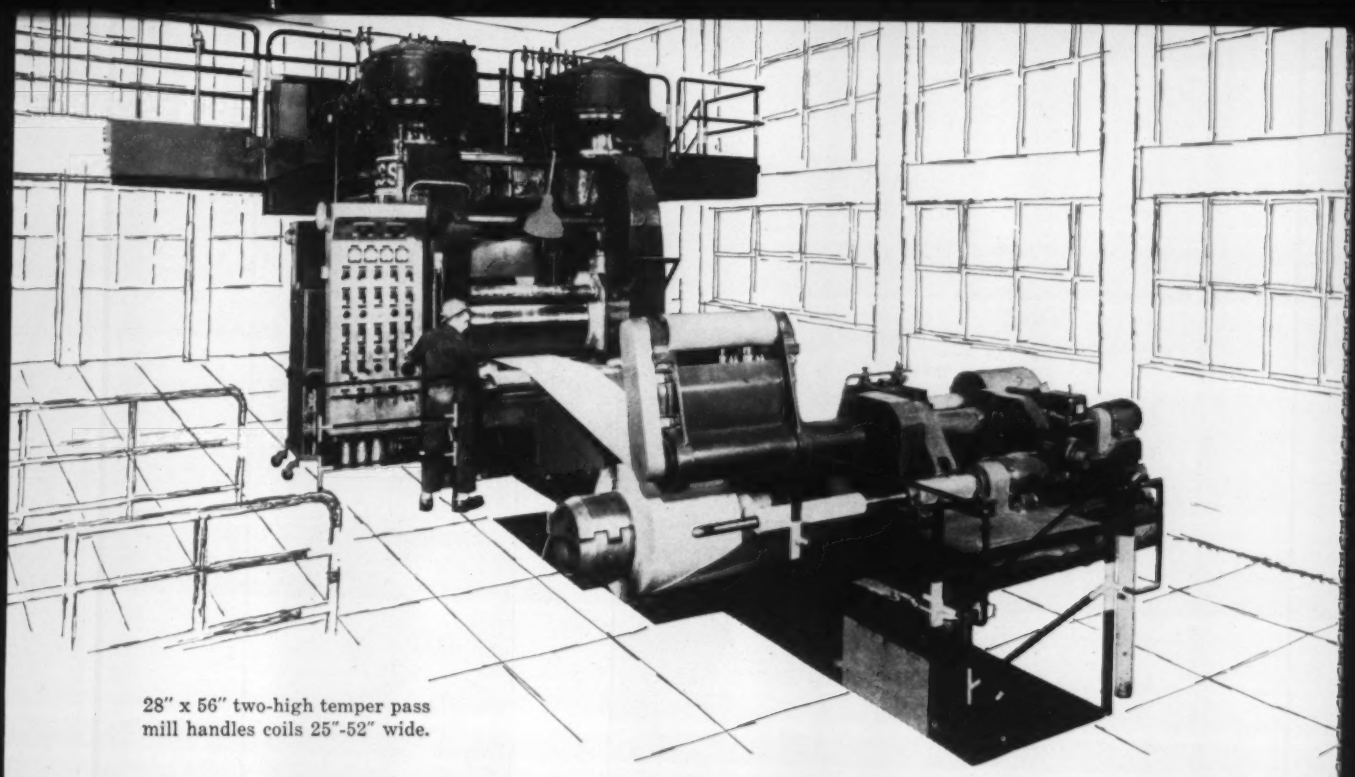
Call your nearby steel service center, or write for free booklet, "What's Your Real Cost of Possession for Steel?"

STEEL SERVICE CENTER INSTITUTE

...YOUR STEEL SERVICE CENTER

Steel

STEEL SERVICE CENTER INSTITUTE
540-G Terminal Tower, Cleveland 13, Ohio



28" x 56" two-high temper pass mill handles coils 25"-52" wide.

Now 2 new Bliss mills help keep tempers under control at Gary Sheet & Tin

Until last summer, Gary Sheet & Tin tempered "stainless" on the temper mills used for carbon steel. Then to add a new dimension of efficiency, the plant decided to set up separate facilities for stainless and installed a new Bliss temper pass mill to handle it.

Product of Gary and Bliss thinking, the mill takes coils as wide as 52", as narrow as 25"; tempers gages from .008-.150" to an average hardness of 83 Rockwell. Result: this plant of U.S. Steel is now more able to take heavy workloads and special orders in stride.

Another Bliss temper mill is paying similar dividends in Gary's continuous pickling line. Key addition of an April '59 expansion program, this 34" x 76" two-high mill with husky entry and delivery bridles enables Gary to handle strip 18"-62" wide, in thicknesses from .059"-.187". It reduces stock 1½-2%, serving to fracture the scale, thus resulting in less pickle liquor required and higher pickling rate.

Can a custom-designed Bliss mill help you solve a profit-robbing problem? See how the Rolling Mill Division has assisted other plants. Write today for our 84-page Bulletin 40-B.

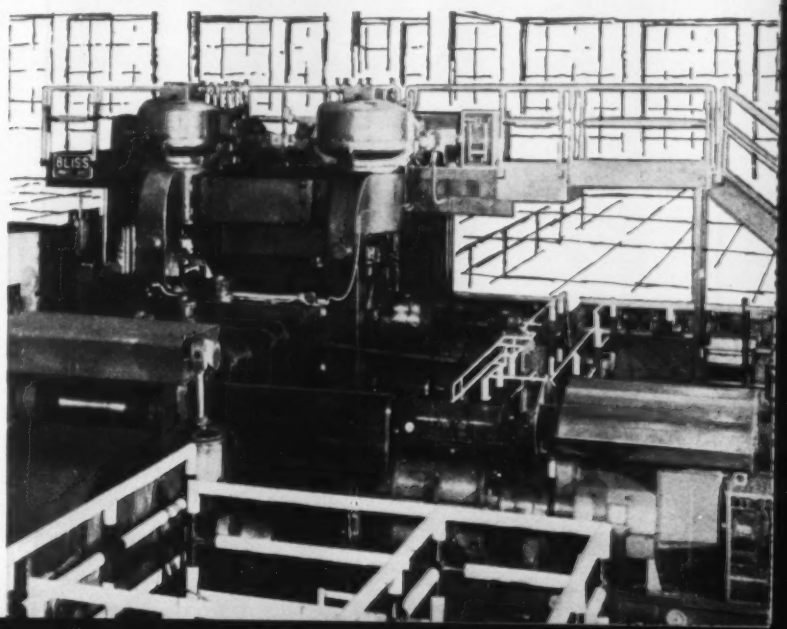
BLISS
SINCE 1857

Bliss is more than a name
...it's a guarantee

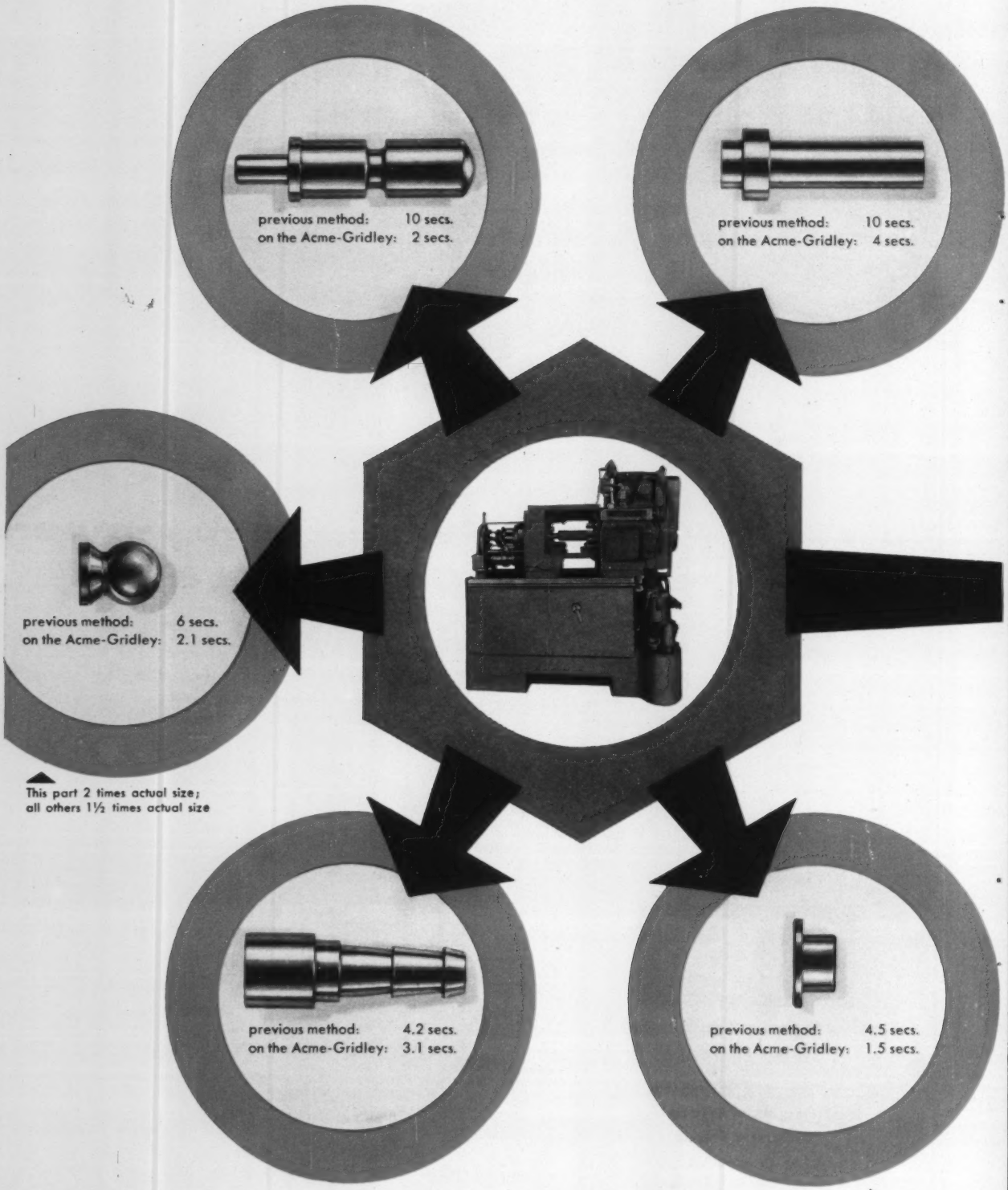
E. W. BLISS COMPANY
Rolling Mill Division
Salem, Ohio

Rolling Mills • Mill Auxiliaries • Amerigear/Bliss Flexible Spindles

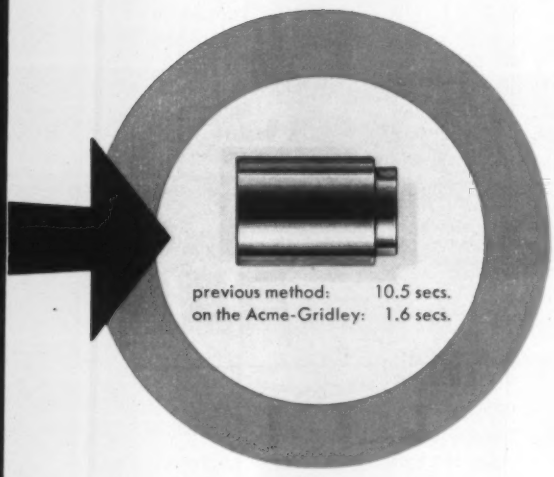
Subsidiary: The Matteson Equipment Company, Inc., Poland, Ohio



34" x 76" two-high mill in Gary's continuous pickling line descales and tempers at the same time.


previous method: 10 secs.
on the Acme-Gridley: 2 secs.
previous method: 10 secs.
on the Acme-Gridley: 4 secs.
previous method: 6 secs.
on the Acme-Gridley: 2.1 secs.
This part 2 times actual size;
all others 1½ times actual size
previous method: 4.2 secs.
on the Acme-Gridley: 3.1 secs.
previous method: 4.5 secs.
on the Acme-Gridley: 1.5 secs.

ACME-GRIDLEYS SLASH AVERAGE MACHINE TIME 68%...

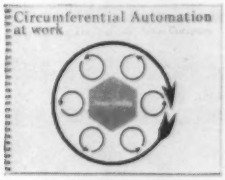


Pay off in profitable new business for screw machine job shop...

Before installing three Acme-Gridley 7/16" RA-6 Spindle Automatics, Carleton Screw Products Co. of Minneapolis found it difficult to keep pace with the demand for greater precision and quality required by current manufacturing standards. Consequently, high costs resulting from slow production methods made Carleton less competitive on short run, small part jobs.

With Acme-Gridleys, it's a different story. Short run, small part jobs are Carleton's bread and butter. The Acme-Gridleys cut average machine time 68% and always produce precision parts that surpass customer specs . . . giving a big boost to Carleton's "repeat order" business.

The 7/16" was *designed* for top economy in the mass production of miniature and sub-miniature parts. It's compact, rugged and has the versatility to handle an amazing variety of jobs. In your shop . . . for years to come . . . it will pay off in lower costs and higher earnings.



The number of *different* jobs that can be set up on any Acme-Gridley amazes everyone. To give you some idea, we've described some 57 actual jobs in a new 64 page bulletin called "Circumferential Automation at Work". For your free copy, call, write or wire.

National Acme

The National Acme Company
189 E. 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N.J.; Chicago 6, Ill.; Detroit 27, Mich.

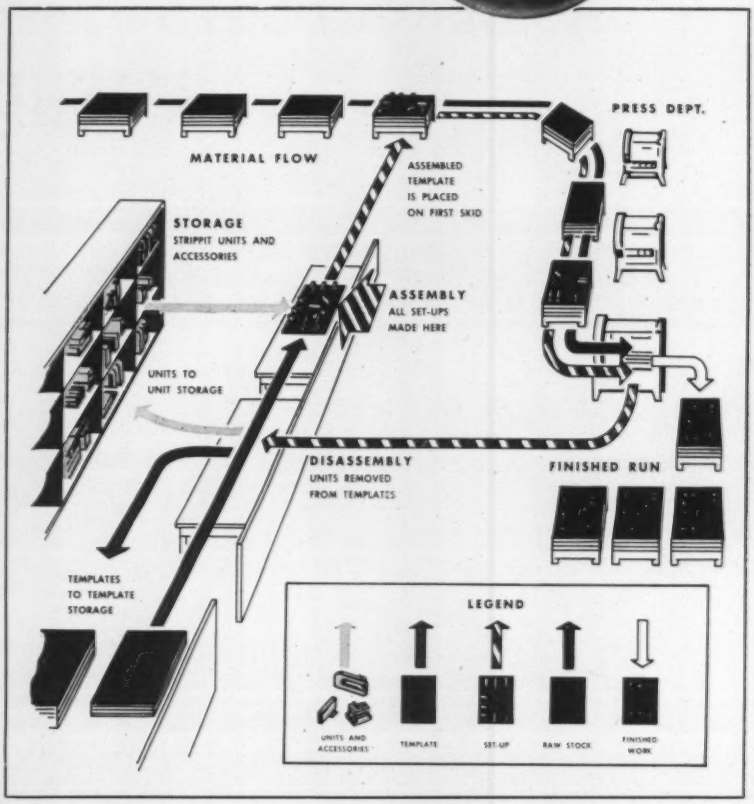
BEAT THE WATCH

with time-saving STRIPPIT hole punching units

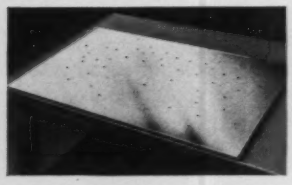
A stop-watch measures *dollars and cents* when it measures the time you spend setting up tooling. But the STRIPPIT System reduces hours to minutes and seconds . . . releases high bracket tool designers, die makers and die setters for work on more complicated dies involving forming, drawing and other operations.

All it takes is a good mechanic to make STRIPPIT setups on bedrails, T-slotted plates or drilled templates. The latter are particularly valuable in saving press down time because the complete setup can be inserted as soon as the previous press run is finished.

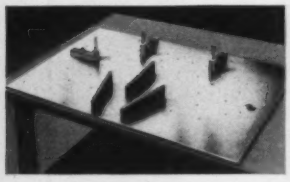
STRIPPIT self-contained hole punching units come in a multitude of sizes and capacities to meet any pattern requirement. Newest of these are the "BN" and "CJ" series which can be used for punching round or shaped holes. Also available are notching units and units for punching angles and extrusions. Write now for the STRIPPIT General Catalog.



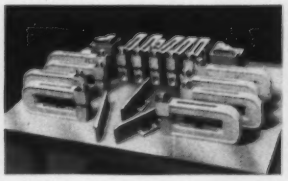
Typical STRIPPIT setup takes only 25.33 minutes from work order to finished piece



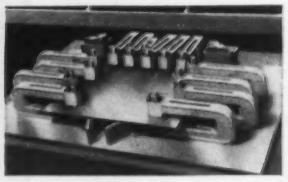
The STRIPPIT System begins with examining the blueprint, selecting the pre-drilled template and placing on setup table.



Feed rails and work stops are mounted securely to the template according to the size and the shape of the blank.



Notching units and hole punching units are mounted. Pilot pins concentric with punch assure precise positioning.



Complete setup is inserted in press and bolted down, shut height is adjusted and first piece punched and checked.

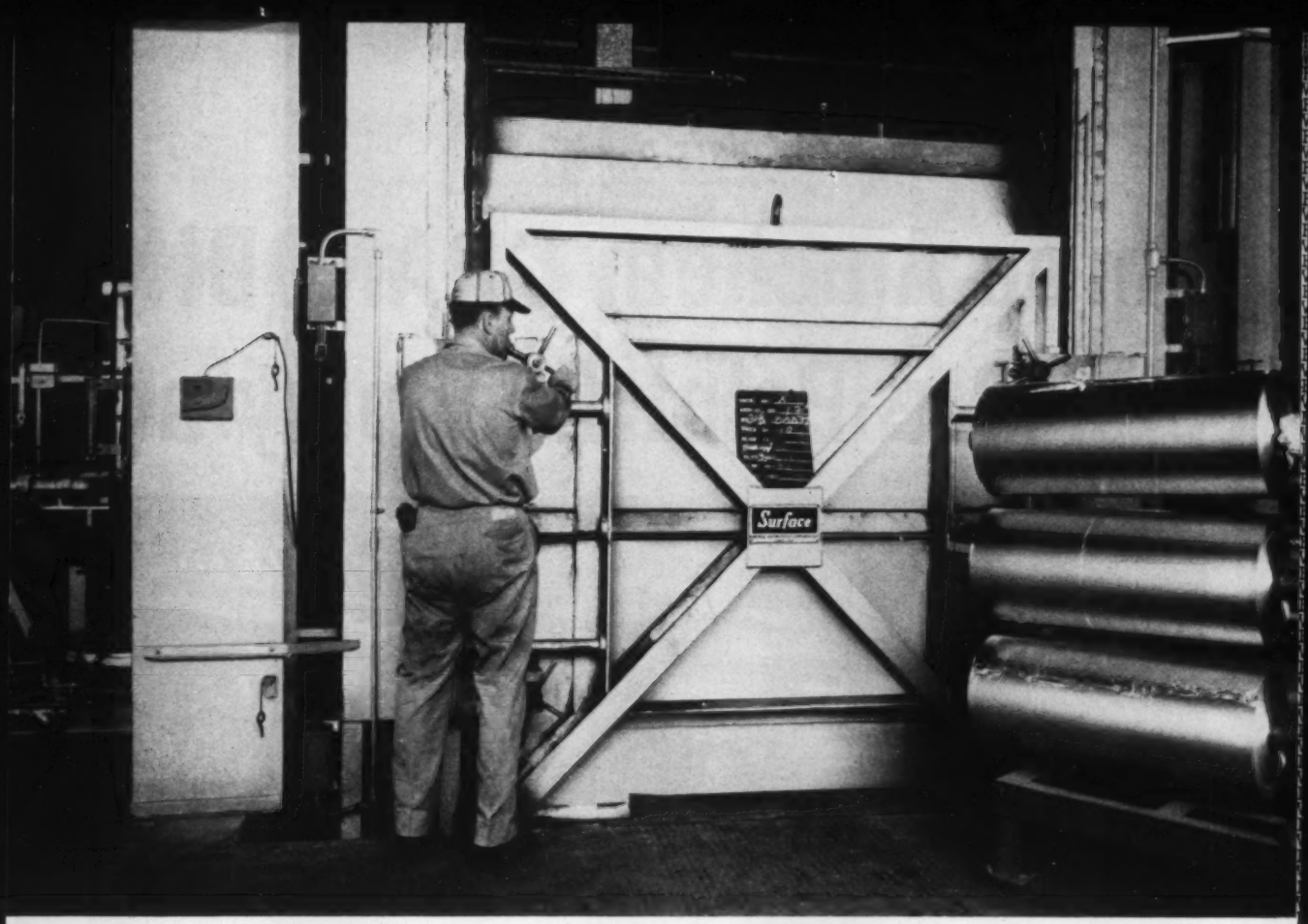
WALES **STRIPPIT** INC.

210 Buell Road • Akron, New York

A UNIT OF HOUDAILLE INDUSTRIES, INC.

In Canada: Strippit Tool & Machine Company, Brampton, Ontario

In Continental Europe: Raskin, S. A., Lausanne, Switzerland *In the British Isles: E. H. Jones (Machine Tools) Ltd., Hove, Sussex, England*



ANACONDA ALUMINUM ANNEALS FOIL WITH LOW-COST UNIFORMITY

in Surface Power Convection Furnaces

Phenomenal temperature uniformity (never varying more than 5°) and low costs are the profits earned by Anaconda Aluminum with four of these Surface Power Convection furnaces in their Louisville plant.

Each furnace anneals an 8,000-lb. load of coiled aluminum foil in a seven-hour heating cycle. Coils are stacked on racks, as you see here, and fork-lifted directly into the furnaces. Surface DX® generator gas protects the foil during the cycle.

Power Convection* equipment simplifies furnace construction,—just one fan, minimum furnace size for its capacity. This reduces both first cost and operating maintenance. For more data on Surface Power Convection equipment write for Bulletin SC-182. Surface Combustion, 2385 Dorr Street, Toledo 1, Ohio. In Canada: Surface Industrial Furnaces Ltd., Toronto, Ontario.

*Trademark of Surface Combustion, Division of Midland-Ross Corp.

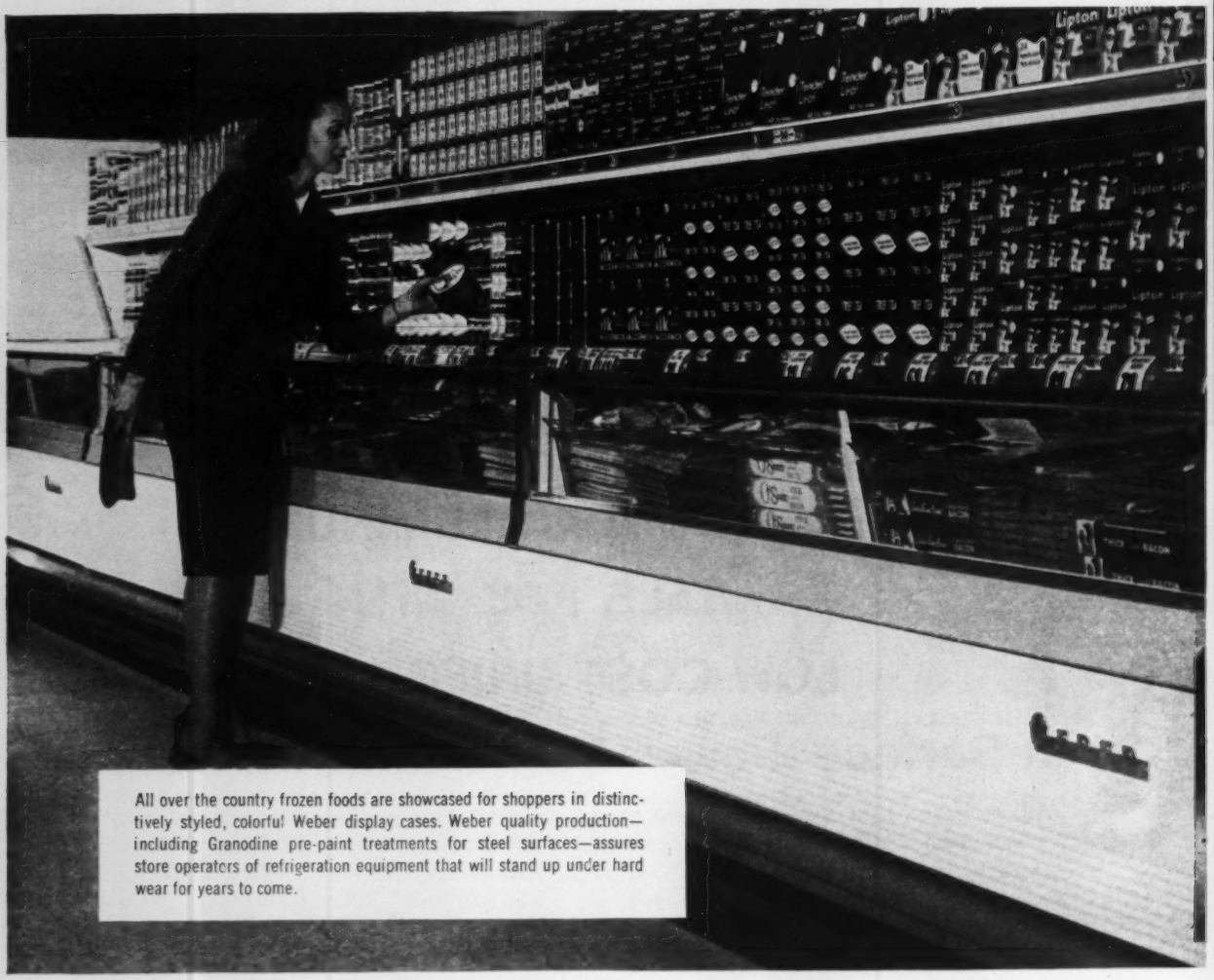
Surface®

A division of Midland-Ross Corporation

MR

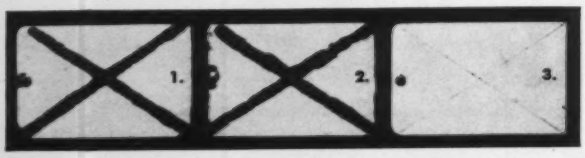
Take a lead from the leaders . . .

Three Amchem GRANODINE* Pre-Paint Economy and



All over the country frozen foods are showcased for shoppers in distinctively styled, colorful Weber display cases. Weber quality production—including Granodine pre-paint treatments for steel surfaces—assures store operators of refrigeration equipment that will stand up under hard wear for years to come.

GRANODINE—The obvious difference in pre-paint treatments



1. Solvent-cleaned—panels failed after 100 hours of accelerated testing.
2. Alkali-cleaned—panels failed after 100 hours of accelerated testing.
3. Granodine-treated—panels excellent after 336 hours of accelerated testing.

Phosphate Systems Provide Quality at Weber Showcase

One line alone achieves fuel savings of $9,000 per year; all three lines maintained by one operator for added labor savings!

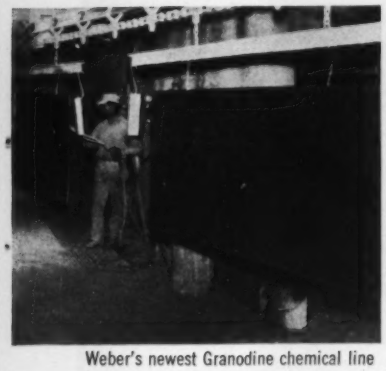
Versatile Weber Showcase & Fixture Company, Inc., headquartered in Los Angeles, places a high premium on quality of its diversified line—supermarket display cases, coolers and fixtures, prefabricated partitions, flooring and lab equipment to mention a few.

High on Weber's quality requirement list is pre-paint treatment of steel products. And their first choice in zinc phosphate coatings is Amchem Granodine. Weber employs three separate Granodine phosphating lines to process hot- and cold-rolled steel.

Prime advantage of Granodine, according to Weber management, is "*Granodine gives us a better piece of merchandise as far as eye-appeal, wearability and service life are concerned.*" Additional savings continue to be recorded in time and labor (a single operator adequately controls all three lines), and a substantial $9,000 annual fuel savings (via use of a Granodine cold zinc phosphate).

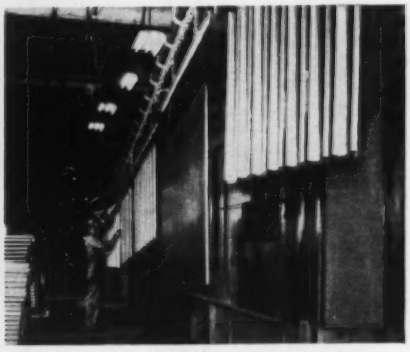
Take a lead from the leaders. If you fabricate steel products—if you want uniform quality in paint adhesion and corrosion resistance—if you want personalized technical service that adds savings in time, labor and cash to your operation, you want to investigate Granodine by Amchem. A call to your local Amchem Representative will furnish you facts and figures.

*Granodine is Amchem's registered trademark for its conversion coating chemical used to produce phosphate coatings on steel.



Weber's newest Granodine chemical line handles steel shelving, large cooler boxes suspended from conveyor.

On Weber's third Granodine chemical line—a cold zinc phosphate—Weber Wall Sheet enters the washer.



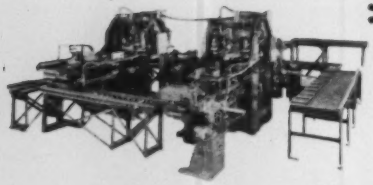
Exiting at right from cold Granodine washer, Weber Wall Sheets receive prime coat spraying.

AMCHEM **GRANODINE**

Amchem is a registered trademark of **AMCHEM PRODUCTS, INC.** (Formerly American Chemical Paint Co.)
AMBLER, PA. • Niles, Calif. • Detroit, Mich. • St. Joseph, Mo. • Windsor, Ont.

36,763* molds per hour?...

10236-SI



* **THE FIGURE IS RIGHT...**

AND ACTUALLY QUITE CONSERVATIVE!

The identification trade mark of SPO states that this organization is the "World's largest supplier of mold-machines." This is not just another advertising claim. There are SPO machines operating all over our globe . . . in almost every country. At this moment, men of every race, creed and color . . . and speaking virtually every language and dialect in the world . . . are producing molds on machines bearing the name SPO. It is our conservative estimate that MORE than 36,763 molds will be produced in THIS hour.

Our leadership has been earned . . . earned through long years of devotion to the industry and applied skill within individual professions comprising the entire field of metals. In foundry molding systems, our technological advances resulting from creative engineering, have established new horizons of molding progress.

SPO leadership will not go unchallenged . . . however . . . we propose to continue our dedication to progress. We will continue to improve our creative engineering services so that we can continue to supply versatile, efficient, economical "packaged" systems to meet every molding requirement, including Turnkey facilities.

WORLD'S LARGEST SUPPLIERS SPO OF MOLDING MACHINES

SPO INCORPORATED
6494 Grand Division Ave.,
Cleveland 25, Ohio

THERE'S A SPO MACHINE FOR EVERY MOLDING JOB

UNCLUTTERED AIRSPACE—how to capitalize on it in your plant—with TRAMBEAM®

Airspace doesn't apply to the airplane alone. The uncluttered air space in your plant is a key to increased profits for you. Face it. The facts of your business operation are to move your raw material in—get it through your plant—and out the shipping dock **at a profit.**

Moving material **overhead** in a swift, unencumbered manner is **our** business. We've been at it for 75 years. Why not talk to a Whiting engineer about Trambeam and what it can mean to the profits of your company. No obligation, of course. Write: Whiting, 15643 Lathrop Ave., Harvey, Ill.
In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.

Get the facts on Trambeam. Write for bulletin M-34.

See our catalog in Sweets

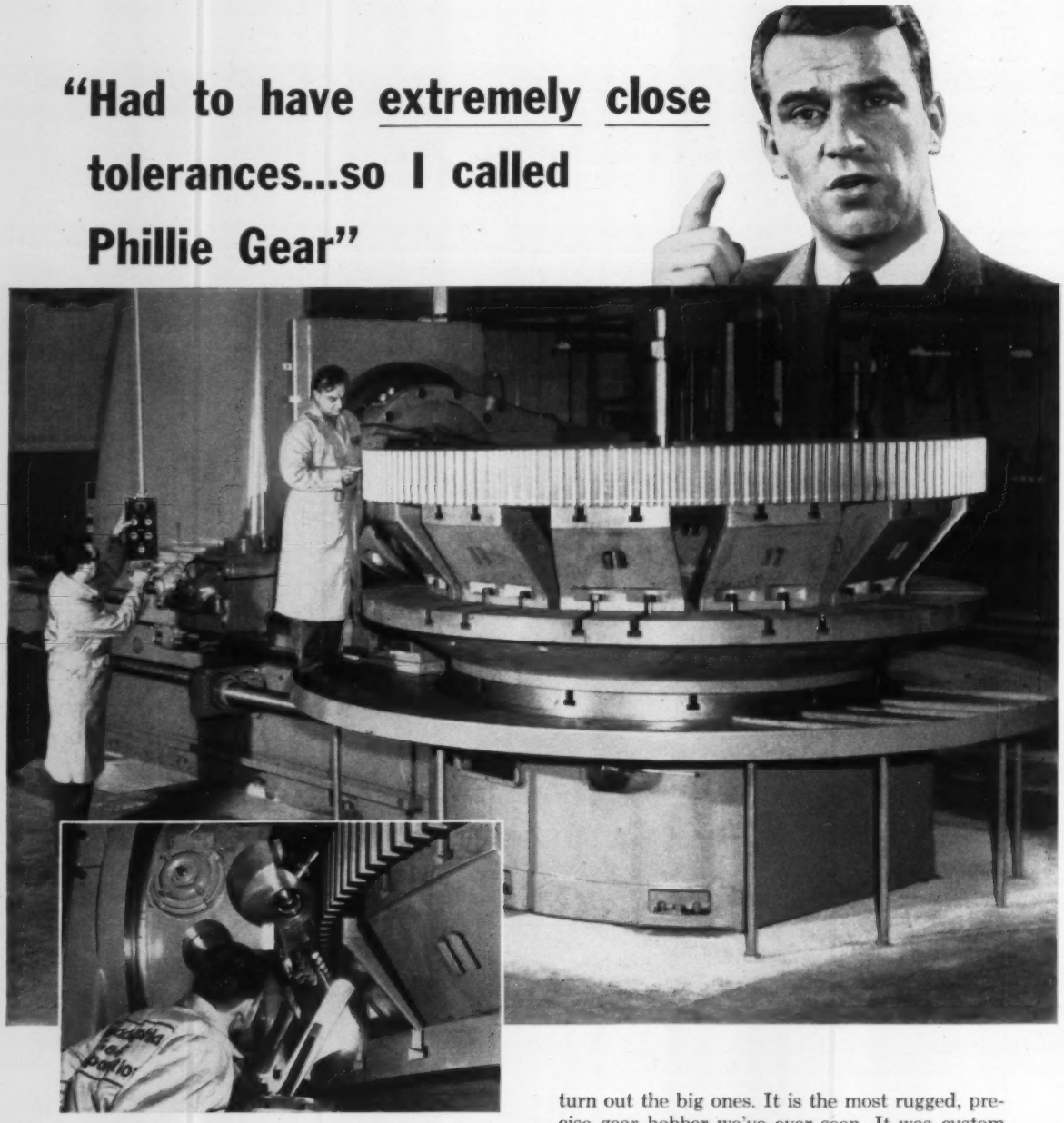
90 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

TRAMBEAM®

WHITING

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL PROCESSING EQUIPMENT

"Had to have extremely close tolerances...so I called Phillie Gear"



Phillie Gear's new hobber at work . . . will handle gears up to 165" dia., 64" face width.

Looking for commercial gearing, cut to exceptionally close tolerances . . . at no increase in cost? Then give us a call. We are equipped better than ever before to meet your needs with the highest quality commercial gearing available today.

This new hobber, the latest addition to our new and expanded facilities, is the machine that can turn out the big ones. It is the most rugged, precise gear hobber we've ever seen. It was custom built to our rigid specifications. Accuracy is certified to ten arc seconds.

Whatever your gearing requirement, our engineering staff is ready to work with you in finding a better solution to your gearing problems. And engineering is backed by the newest, most comprehensive production facilities in the industry.

For complete data, write on your company letterhead for our gearing catalog G-127.

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Important differences in fire-resistant fluids

Unlike petroleum oils, fire-resistant fluids have markedly different chemical properties which should be carefully considered before making a final selection.

To simplify this selection, we show here some of the variables—and limitations—of the three major fire-resistant types. Houghton is uniquely qualified for this unbiased analysis since we favor no one type over another. We make them all—and a full range of hydraulic packings as well.

1. Water-Glycol Fluids

These fluids contain water, glycol and a thickener. They provide the highest degree of fire protection. They are also compatible with the widest range of packing materials including those commonly used with petroleum oils. They should only be used, however, in systems operating at reservoir temperatures below 150°F.

Houghton's Houghto-Safe 200 and 600 Series are of this type and enjoy top acceptance and use by the armed services, as well as general industry. This wide-spread usage is due to important additives that provide *extra* anti-wear, rust inhibiting, anti-foam and metal deactivator properties to improve performance and increase pump life.

2. Phosphate-Ester Fluids

Fluids of this type are composed of straight phosphate esters and may contain small amounts of additives. These fluids can be used over the widest range of hydraulic pressures; they provide maximum lubricity for heavy bearing loads, and will stand up where ambient temperatures exceed 150°F. Packings used with these fluids must be Butyl, Butyl-Fabric or Polysulphide-impregnated Leather.

Houghton's Houghto-Safe 1000 Series are phosphate-ester fluids specially selected and compounded with additives to improve wear and rust resistance and add other proven operating benefits. Here again, Houghto-Safe 1000 Series has earned acceptance and is used on many military and space projects, as well as many of industry's toughest applications.

3. Emulsion Fluids

These fluids are either emulsions of water-in-oil (non-ionic) or oil-in-water (anionic). The following statements pertain to the water-in-oil type which are most widely used in industrial hydraulic systems.

Since these fluids are made of water and petroleum, they are compatible with standard Buna N rubber packings. They are also the lowest cost of all fire-resistant fluids. Their fire resistance is also the lowest of all three types; they should be used only in areas requiring a moderately safe fluid. The operating pressures of these fluids is generally limited to under 1000 psi.

Houghto-Safe 5000 Series designates Houghton's emulsion type fluid. It is a water-in-oil (non-ionic) fluid not affected by water hardness. Special additives are used to provide stability of the emulsion and to increase lubricity.

COMPARISON OF HYDRAULIC FLUIDS

Fluid Type	Viscosity Temperature Characteristics	Fire Resistance	Lubricity	Max. Fluid Temp. °F.	Relative Cost
Emulsion Fluids	Fair	Fair	Fair	See Note	1
Water-Glycol Fluids	Very Good	Excellent	Good	See Note	2
Phosphate-Ester Fluids	Poor	Good	Very Good	See Note	3

NOTE:—The Joint Industry Conference (JIC) Hydraulic Standards recommends the following where systems are operated continuously.

1. **For water base fire-resistant fluids, the temperature of the fluid should be controlled so as not to exceed 120°F. at the pump inlet.**
2. **For other fluids, including petroleum oil, the temperature of the fluid should be controlled so as not to exceed 130°F. at the pump inlet.**

For unusual system conditions where it is impossible to adhere to these reservoir temperature levels, the Houghton representative should be consulted.

For detailed information booklet describing all types of fire-resistant fluids, or help in selection, call your Houghton representative or write: E. F. Houghton & Co., 303 W. Lehigh Avenue, Philadelphia 33, Pa.

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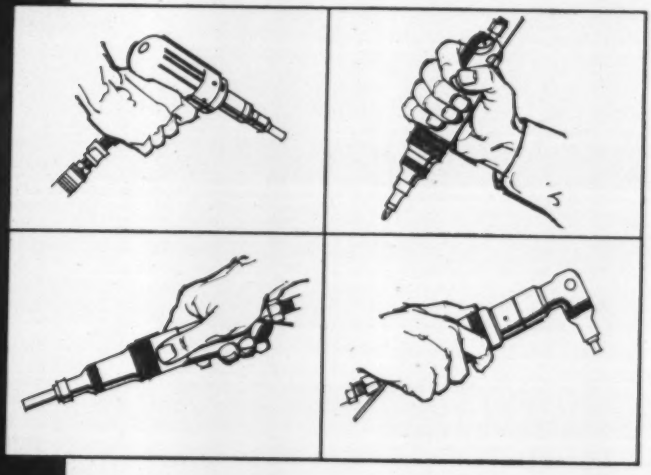

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4. Externally located heat exchanger and pump for easy maintenance and high penetrating oil flow in the quench cycle.
5. Fan circulation for even distribution of heat *without* use of baffles.
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7. Fuel-fired or electric models available.
8. Special options — automatic quench retractor, double-chamber design for two independent temperatures and two independent atmospheres, temperatures to 2100°F.

Suitable for carbonitriding, carburizing, bright hardening, annealing, normalizing and brazing, the standard "Clean-Line" furnace is used for heat treatment of metal to 1850°F. Complete systems are available . . . including heat treat and quench unit, gas generator, washer and tempering furnace.

Hevi-Duty's "Clean-Line" furnace is just one in a full range of products: heat treating furnaces, ferrous and nonferrous metal melting and holding furnaces, and industrial ovens — all available fuel-fired or electric. Get full details from your Hevi-Duty sales engineer or write to Hevi-Duty, Watertown, Wisconsin, for Bulletin D 100A.

See it at the Western Metal Show. Booth No. 187

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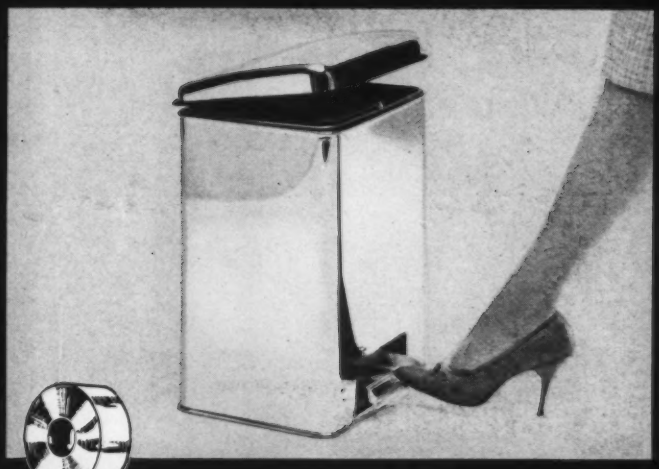

IN THE KITCHEN

These eye-catching products use functionally a basic Nickeloid Metal. The finish of Chromium, Nickel, Brass or Copper is electroplated to a base metal, usually Steel (but often Zinc, Brass or Copper).

Mostly, Nickeloid Metals are supplied in continuous coils in widths up to 24" for modern, low cost fabrication. They're also available in sheets and strips. Optional: bright or satin finishes, plating one or both sides, a galaxy of stunning patterns and crimps.

Quality plating produces metals so durable they can be fabricated, even quite severely drawn or bent. Rejects minimized. For severe stamping, we offer Mar-Not protective coating that is easily peeled off after its job is done.

These handsome articles of daily use are striking indeed! Not a little of this is achieved by the functional use of bright plated Nickeloid Metals in Chrome, Brass or Copper finishes. But look again! These pictures carry a deeper, even more dramatic story . . . the story of a *new concept* of manufacture. Not always do artisans work with raw steel sheet. Not always is the final finish applied by the extra step of painting or plating. With Nickeloid Metals this finish is built-in, and it's done by a company which has dedicated itself to electroplating of sheets and coils for industry for over 60 years! The use of Nickeloid Metals as a pre-finished raw material proves the theorem that a straight line is the shortest distance between two points. Write for free Introductory Kit that unfolds the entire story and provides you with metal samples. Or, phone a Nickeloid sales office in one of the principal cities.

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how Parish ingenuity reduced a forming operation to 1/1,000 of a second!

Operator removing an outer warhead shell formed and shaped by explosives.

problem: How to reduce the time and cost involved in forming large aluminum alloy missile warheads.

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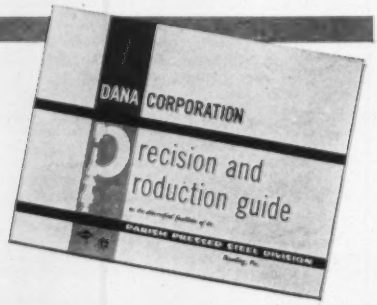
Parish facilities, skill and ingenuity have materially reduced time and cost on thousands of intricate production problems. If you have a production problem—large or small—requiring stamping, machining, forming, heat-treating, welding, balancing, forming and assembling, why not insure top-flight quality and performance by calling Parish today?

Write for your copy of this illustrated booklet describing the diversified facilities available to you at Parish.



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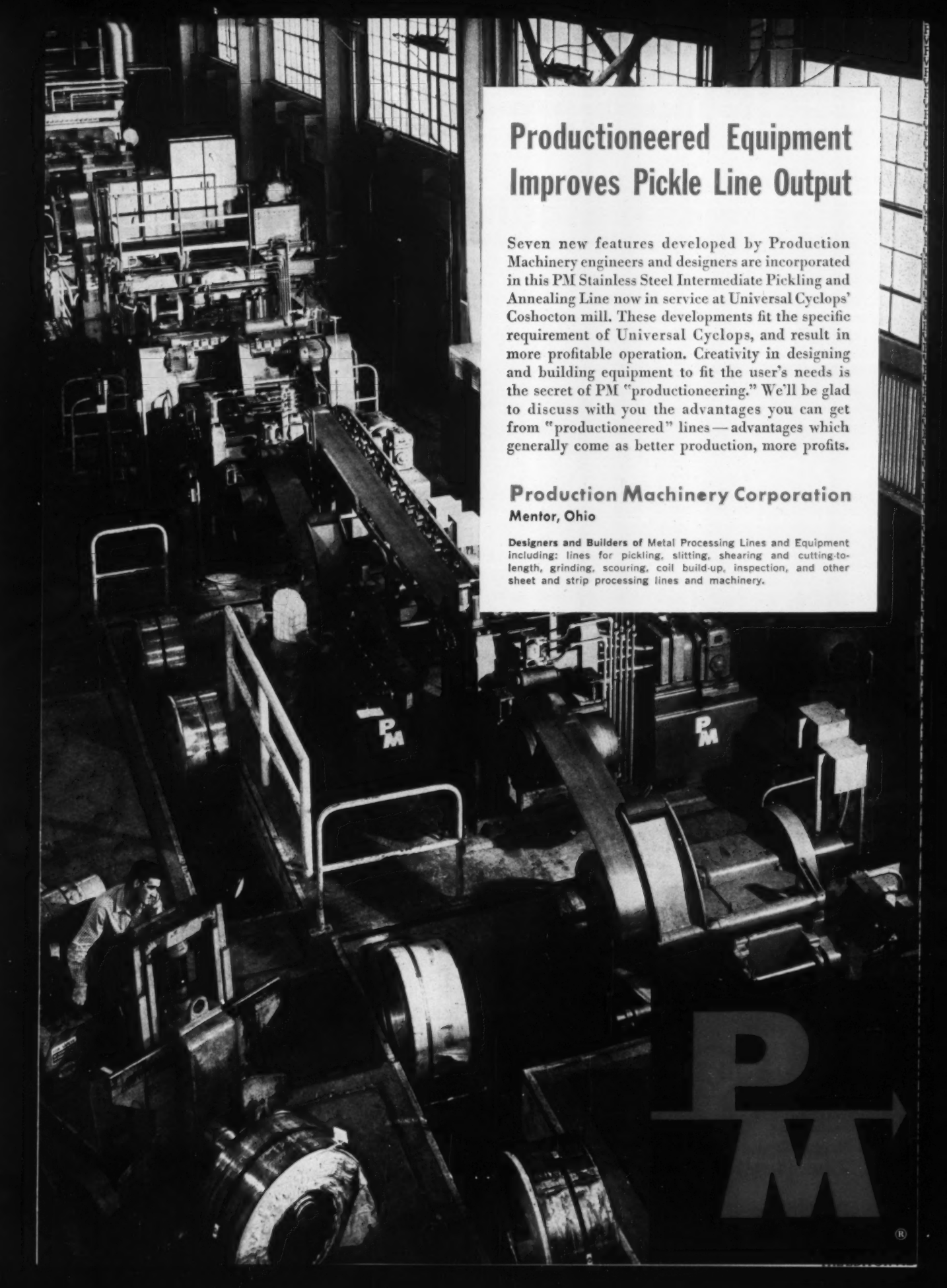

Productioneered Equipment Improves Pickle Line Output

Seven new features developed by Production Machinery engineers and designers are incorporated in this PM Stainless Steel Intermediate Pickling and Annealing Line now in service at Universal Cyclops' Coshocton mill. These developments fit the specific requirement of Universal Cyclops, and result in more profitable operation. Creativity in designing and building equipment to fit the user's needs is the secret of PM "productioneering." We'll be glad to discuss with you the advantages you can get from "productioneered" lines — advantages which generally come as better production, more profits.

Production Machinery Corporation

Mentor, Ohio

Designers and Builders of Metal Processing Lines and Equipment including: lines for pickling, slitting, shearing and cutting-to-length, grinding, scouring, coil build-up, inspection, and other sheet and strip processing lines and machinery.

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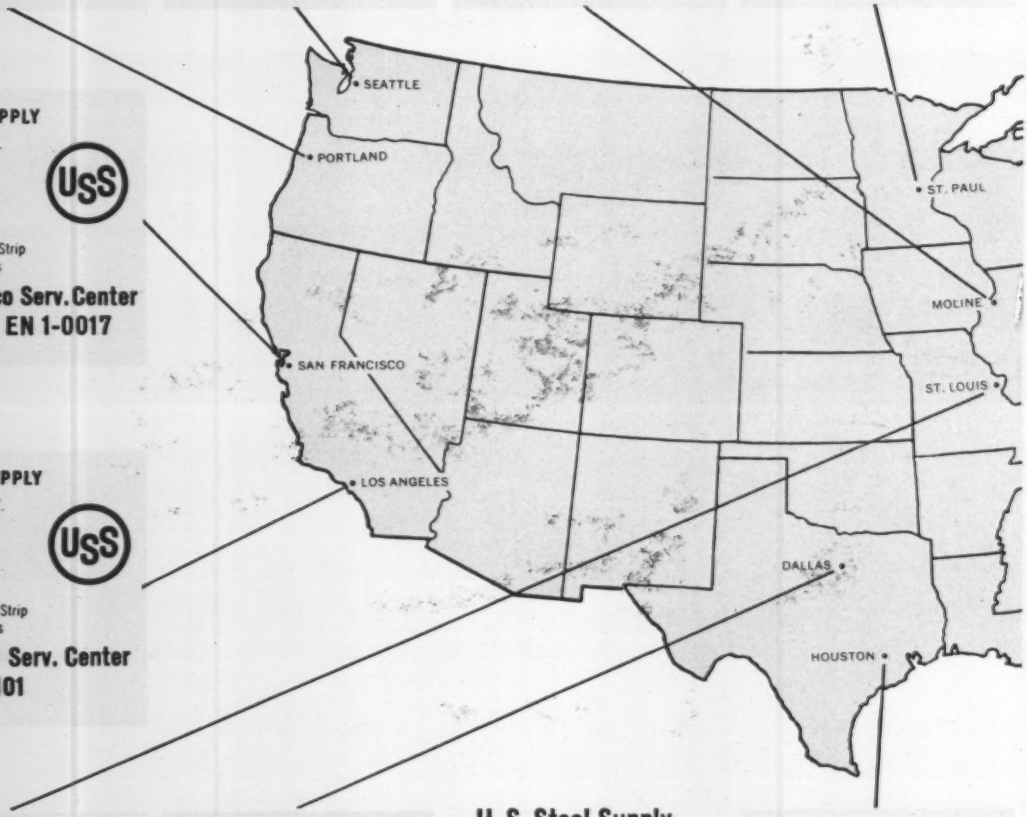

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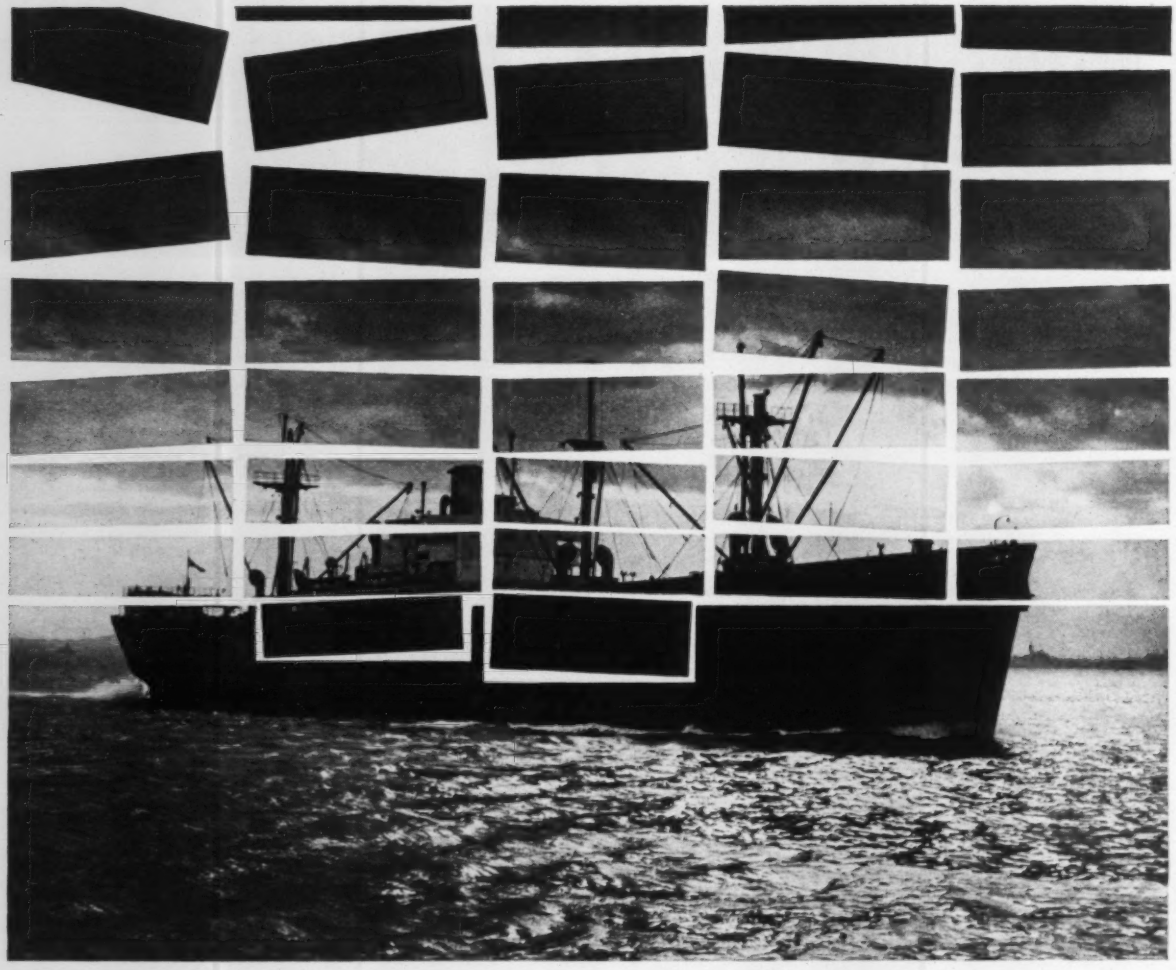


For New York Shipbuilding Corporation,

CORO-GARD® 1706 STOPS PICKLING TANK LEAKS, PUTS PROTECTION ANSWERS IN PLACE!

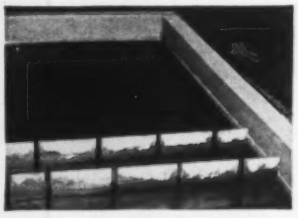
BRAND COATING

New York Shipbuilding Corporation, Camden, N.J., formerly had to repair pickling tank leaks every 4 to 6 weeks. A 15% sulphuric acid solution penetrated the coating then used—caused tank corrosion and leaks. Now, all exposed tank surfaces are protected by CORO-GARD 1706 Brand Coating, and *no leaks have occurred during more than a year's constant contact with the acid solution!*

CORO-GARD 1706 Coating also withstands such corrosive fluids as hydrochloric acid solutions, distilled and salt water, and alkalies, even at continuous heat up to 120°F. It resists attacks by weather, ozone, oxygen and many industrial atmospheres—wards off erosive attack by abrasive-laden liquids. CORO-GARD 1706 Coating is easily applied by brush to unprimed steel, aluminum, copper, galvanized steel, concrete, wood and some plastics. It air-cures to a tough, rubbery protective film.

What can CORO-GARD 1706 protect for you? Call the nearby 3M Field Engineer for technical assistance and information. He can also provide detailed data about hundreds of other 3M adhesive, coating and sealer formulations created to solve specialized problems in protection and fastening. Or write AC&S Division, 3M Co., Dept. SBEE-31, St. Paul 6, Minn.

"CORO-GARD" is a reg. TM of 3M Co.



Pickling tank protected with CORO-GARD 1706 Coating experienced no corrosion, no leaks after more than a year's exposure to 15% solution of sulphuric acid.

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±.0001 accuracy
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The new Model 275-40 presents every famous Lucas feature, *including saddle feed*, compacted into a 2¾″ spindle machine specially suited for small, precision work. Any way you look at it, this new Lucas has the size and the machining versatility to fit into your shop or tool room setup. It's a truly profitable machine because it has so much and does so much. You get a built-in rotary table, tape programming if you want it, extreme accuracy for close tolerance machining and on-machine inspection, a new simplified control system, and many other features. Your Lucas representative can give you the whole story and arrange a demonstration right at the Lucas plant if you wish. Contact him or write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of precision machining small, intricate pieces . . .

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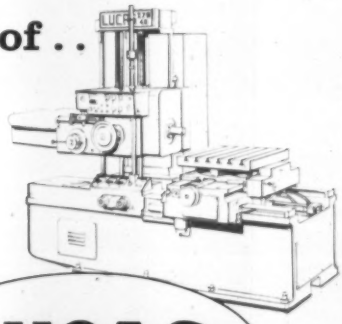

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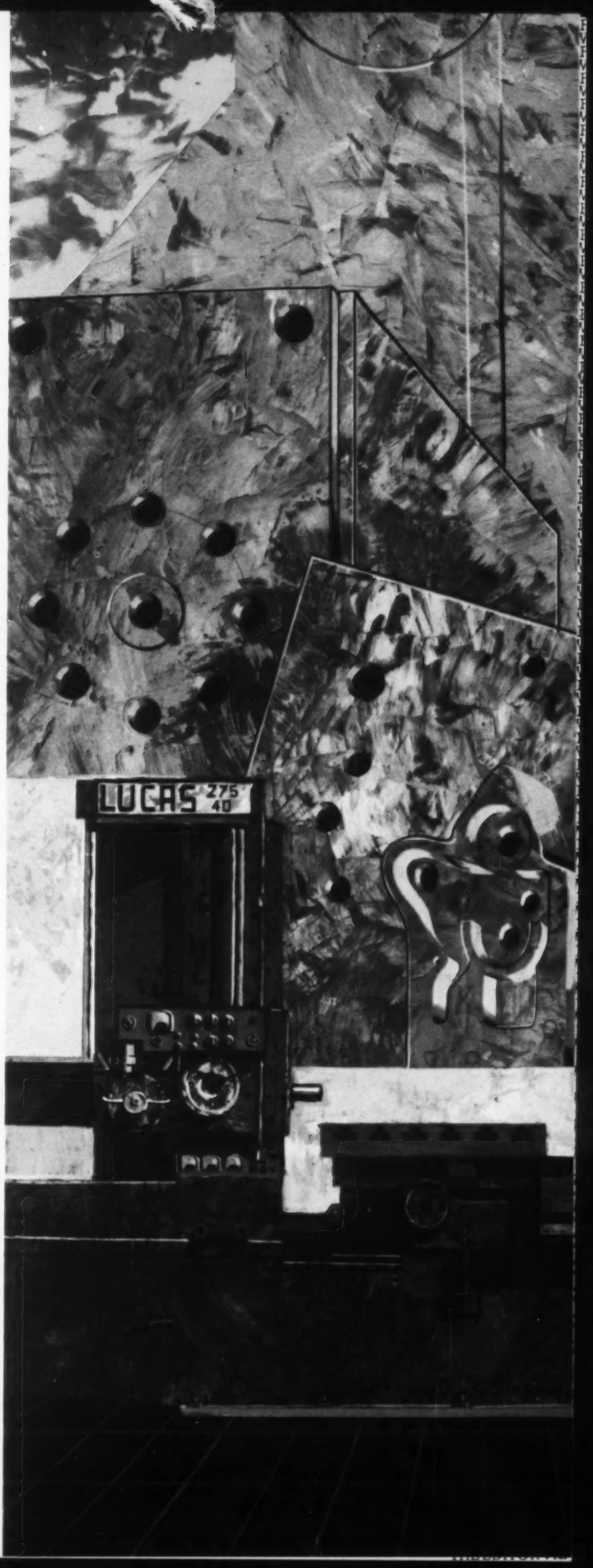

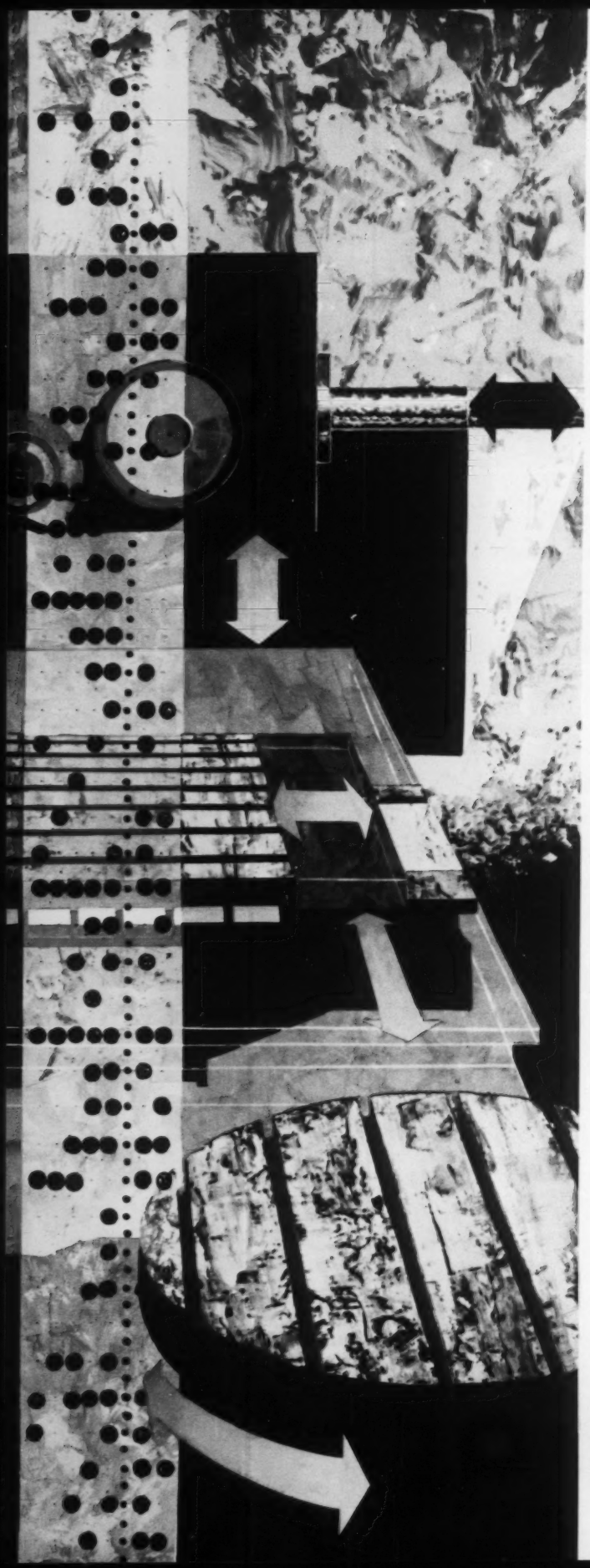

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. . . think of Lucas and tape. They're made for each other. Here's why. The Lucas machine can do more horizontal boring, drilling and milling work better than any other machine on the market. Couple this basic efficiency of a Lucas with the cost savings and reliability of tape control and you have an unbeatable combination for profitable work of the highest precision.

Lucas has applied numerical controls to its full range of boring, drilling and milling machines for a number of years. The various combinations of controls available have all been successfully applied by some of the most knowledgeable metalworking firms in the country. Your Lucas representative can discuss in detail some very interesting case histories and arrange a demonstration for you. Contact him or write Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland, Ohio. When you think of profitability . . .

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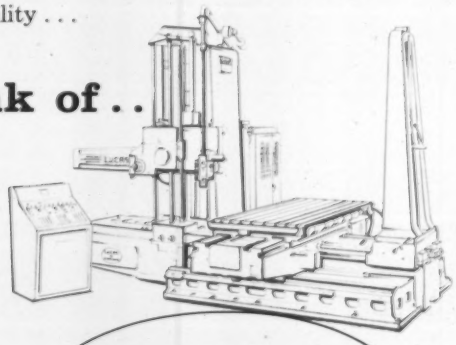

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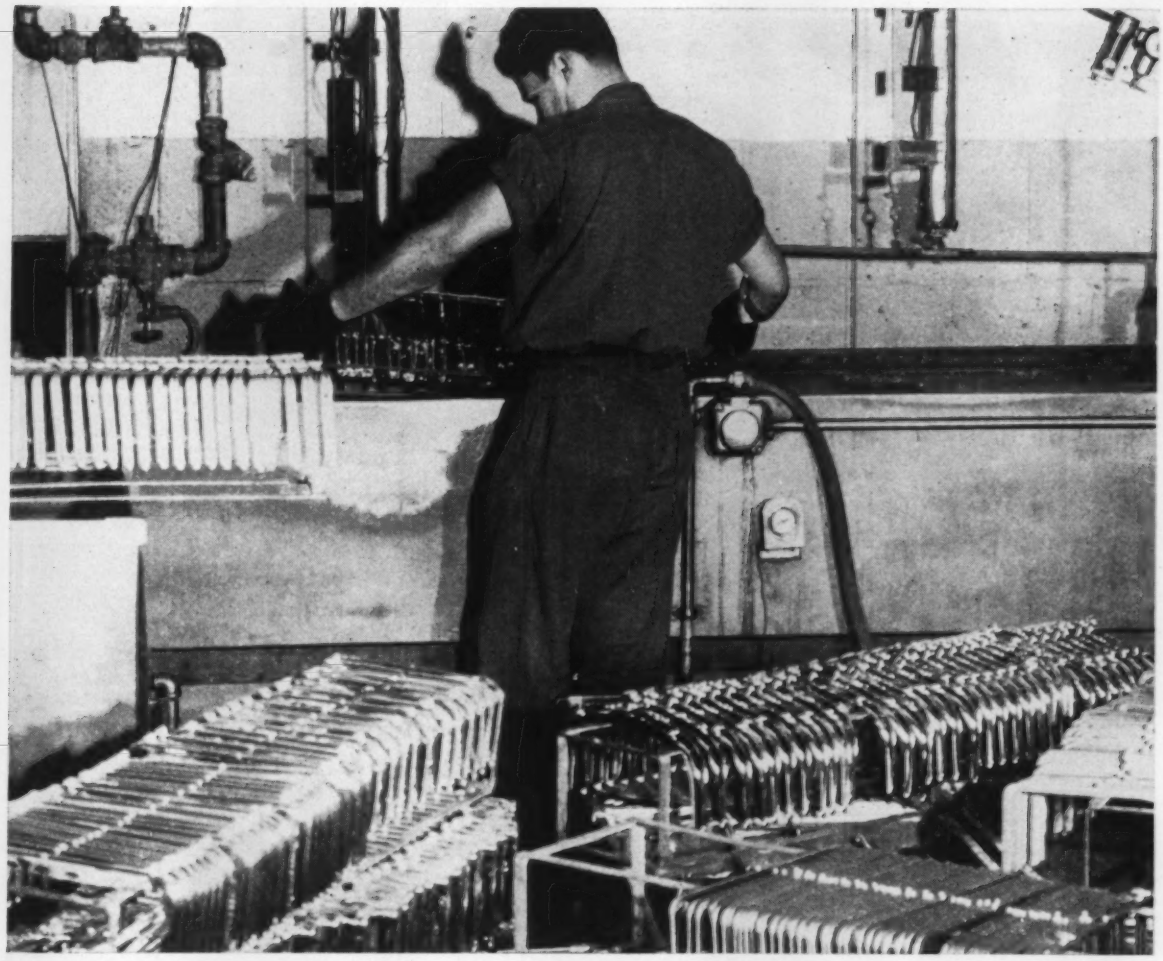


Metgal Novelty Company, Richmond Hill, L. I., degreases metal handbag frames.

302,400 PARTS BEFORE CLEANOUT

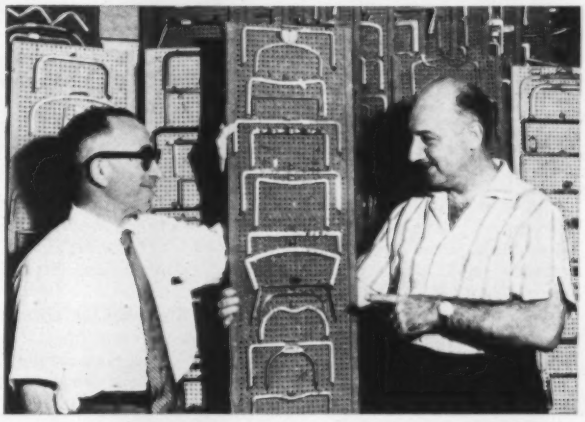
Metgal Novelty Company degreases thousands of metal handbag frames each week with Nialk® TRICHLORethylene.

It's not a simple cleaning job. Besides grease, they have to remove insoluble buffing compounds from the work. The metal might be brass, steel, plated copper or nickel plate.

The tanks "never go acid," says Sal Romano, co-owner. The stabilizer in Nialk TRICHLOR has *psp*—permanent staying power. It lasts, doesn't weaken between cleanouts. Since they get complete recovery of stabilizer on cleanout, they never have to add fresh stabilizer.

Regular tank checks are important to Metgal, too. Romano says, "Hooker and its local distributor, H. Harrington & Company, keep an eye on our operation so there is no undue loss of solvent."

Regardless of the metals you're working with, Nialk TRICHLOR can help solve your cleaning problems and save you money. Hooker's experience is yours for the asking. Call or write us about your problems or see your chemical distributor.



Henry Green (left), designer for H. Margolin & Company, leading handbag producer, and Richard Romano, Metgal co-owner, look over a display rack of handbag frames.

HOOKER CHEMICAL CORPORATION
1203 Union Street, Niagara Falls, New York

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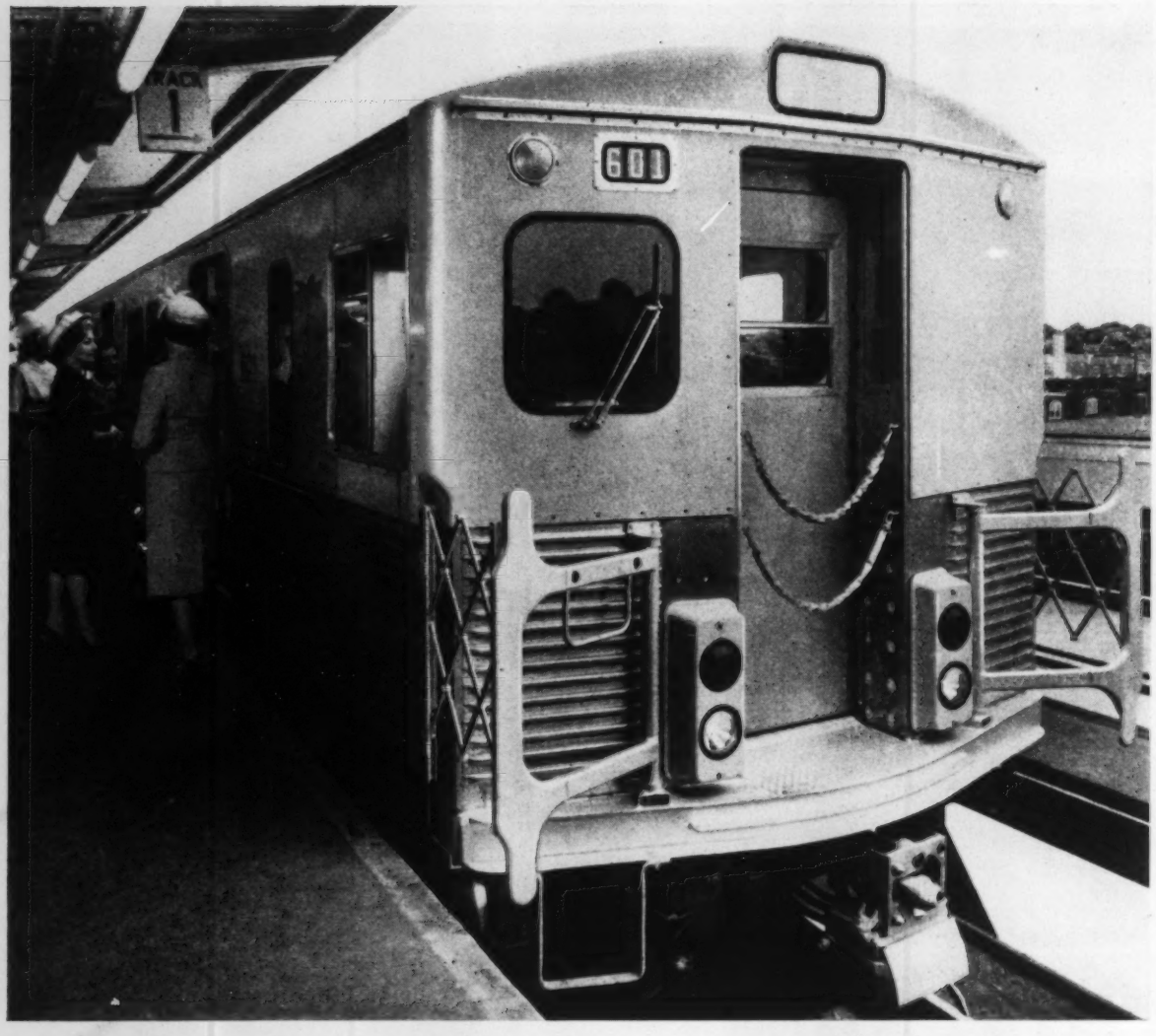

How Nickel Stainless Steel "lightweights" curb Philadelphia subway costs by $6.4 million

Commuters using the Market-Frankford elevated subway line in Philadelphia are smiling these days. So are transit authorities. That's because the line's new subway cars are the most modern in design for passenger comfort . . . and the most economical the city could buy.

Compared to competitive subway cars, during a 35-year depreciation period these new Nickel Stainless Steel cars will:

Operate on $2.4 million less power. They are solidly constructed, yet are so light they run on 12% less electric power than conventional cars based on the same specifications but fabricated from other materials.

Require $4 million less maintenance. Designed and built from Nickel Stainless Steel by The Budd Company to specifications set by the City of Philadelphia and the Philadelphia Transportation Company, these cars need no painting and virtually no exterior maintenance . . . because Nickel Stainless Steel resists corrosion and retains its handsome finish.

And because they are the lightest cars for their size ever built, they:

Help cut running time by 6 minutes. Thanks to the excellent combination of stiffness and high strength found in Nickel Stainless Steel, their thinner-gauge body shells reduce costly dead-weight and make it easier for powerful motors to increase acceleration and braking rates.

Can Nickel alloys save you money? Alone or with other elements, Nickel improves hundreds of alloys, making possible almost any desired combination of properties for meeting specific service demands...while reducing long-term costs. For a guide to information about Nickel, its alloys, and their industrial applications, send for our catalogue of publications. Ask for List "A".

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Inco Nickel

Nickel makes alloys perform better longer

$3 Billion Gap

Seven machining authorities (Page 96) say metalworking managers are wasting as much as $3 billion annually because metal cutting practices are not following the best known technology. We're spending that much unnecessarily simply because we're not using what we know.

That startling statement recalls a story from our youth. A salesman trod across a newly plowed field to offer a venerable farmer a set of books on better farming methods. He proffered a most persuasive spiel, pointing out how the literature would help the farmer increase his profits, enable him to buy more comforts for his family, and better provide for his old age. Would the farmer buy his books?

"Nope."

"Don't you believe these books could teach you how to farm better?" the salesman asked.

"Yup."

"Then why won't you buy them?" the salesman persisted.

"Ain't farmin' as good now as I know how," replied the farmer.

With the squeeze on profits the big metalworking story of 1961, we suggest that all metalworking managers take a look at how their shop practices compare with known and demonstrated technology.

Here is a way to reduce costs by improving efficiency.

Here is a way to narrow the advantage foreign manufacturers (much lower wage costs) have over U. S. industry.

And here is a way to gain an advantage over all less efficient competitors.

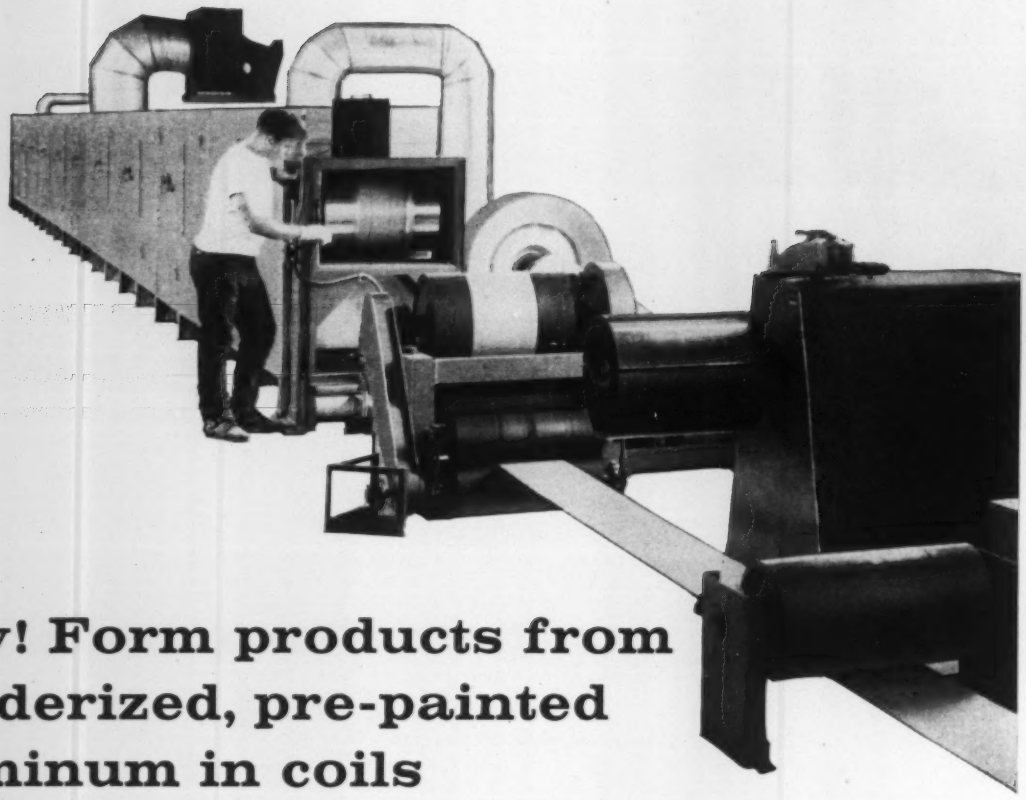
While the survey in this issue covers only the removal of metal in the form of chips, we suspect that a similar lag between practice and known technology exists in heat treating, welding, forming, assembly, material handling, and many other operations in metalworking plants.

In the highly competitive sixties, we will have to work with the best knowledge available to us.

Let's close the gap.

Walter J Campbell

EDITOR



Now! Form products from Bonderized, pre-painted aluminum in coils

A modern, new way to better products at lower manufacturing cost. Use Bonderized aluminum coil stock with baked-on paint, ready for fabricating.

Automated straight-line production assures uniform Bonderized and roll coat painted coil meeting the highest quality control standards.

The Bonderite coating on aluminum stock accomplishes the double job of controlling corrosion and anchoring the paint. Paint adhesion is so spectacular that the most severe forming operations can be accomplished without finish failure.

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Improve manufacturing efficiency, product performance and customer satisfaction by forming your aluminum products from Bonderized, pre-painted coil stock. The Parker representative has complete, helpful information for you.

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- Gutters and downspouts
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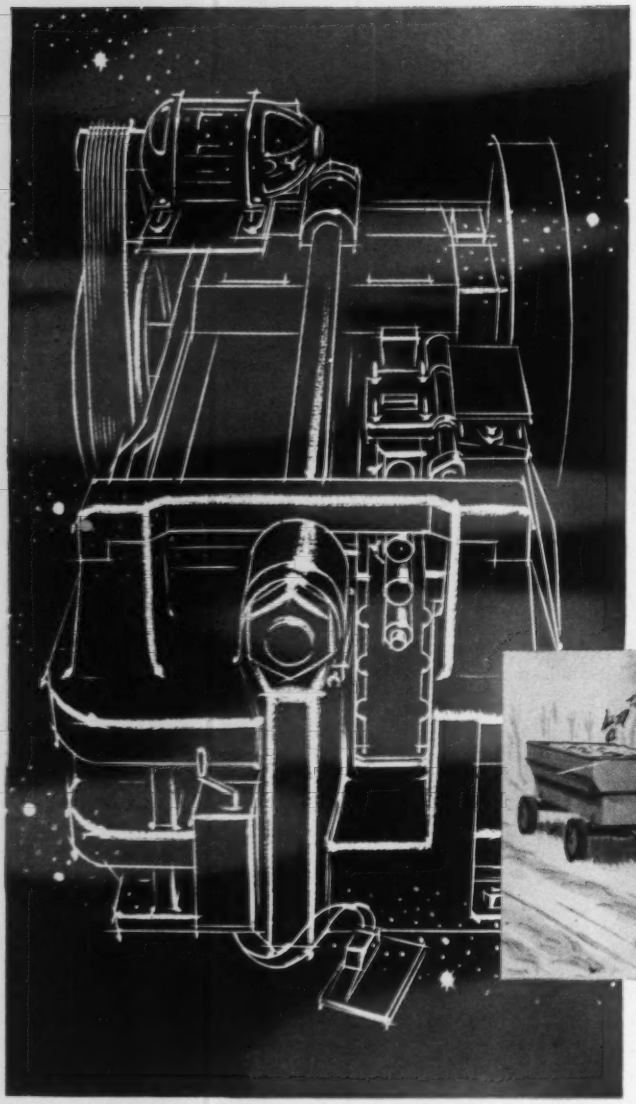
- Storm and screen frames
- Windows
- Awnings
- Cabinets
- Mobile homes

. . . a few of many aluminum products now being made from Bonderized painted aluminum coil stock.

Photo courtesy KEYSTONE ALLOYS COMPANY

Company

TROPICAL—heavy duty maintenance paints since 1883



RESISTANCE TO PUNISHMENT of any severe-service part increased by designing it to be forged

Upsetter, or horizontal forging machine

Gear blanks for tractor and farm implement transmissions are designed to be upset-forged, usually with integral forged stub shafts. Forging gives these vital parts maximum resistance to gear-clashing shifts. Transmission life can be equal to equipment life when gears are FORGED.

When you *design with forgings* right from the start, you take full advantage of the many benefits which only forgings offer: highest ratio of strength to weight . . . highest resistance to impact, shock, vibration, torsion . . . preferential orientation of flow lines in the forging to concentrate strength where required . . . absence of wasteful inclusions and voids.

Forged parts start out as *better* metal . . . are made *even better* by the hammer blows or pressures of the forging process. Write for literature to help you design, specify, and procure forged parts.

When it's a vital part, design it to be FORGED

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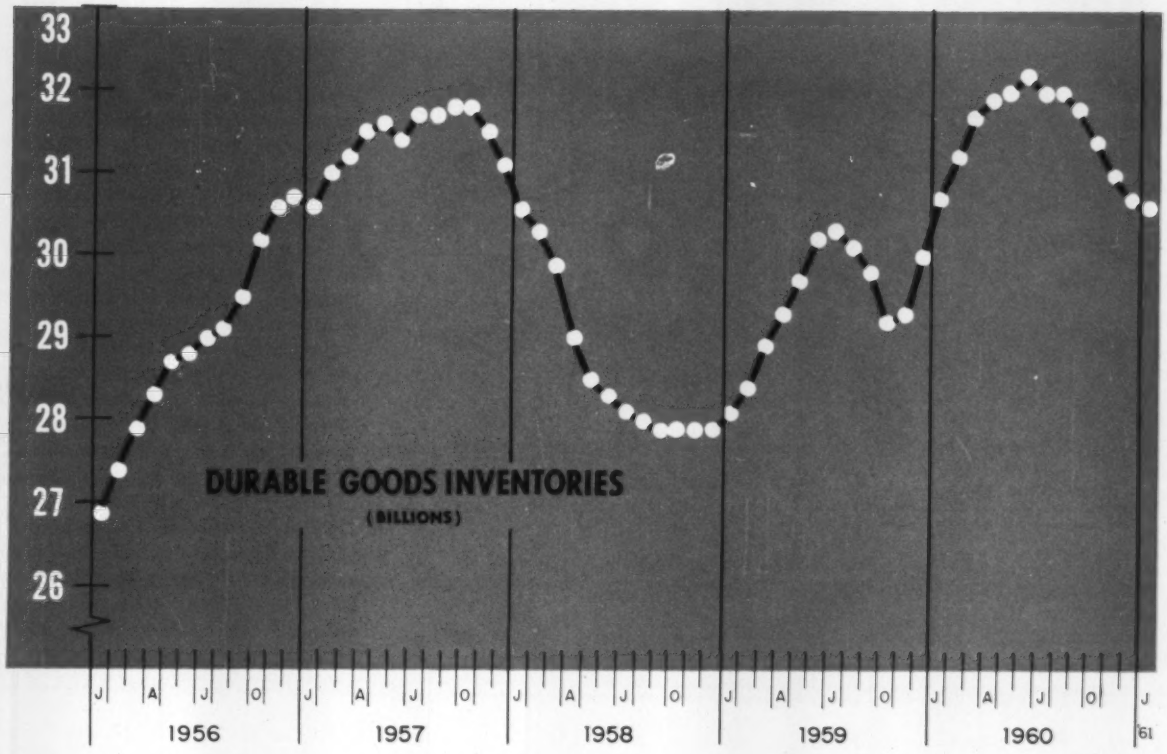


Source: Commerce Department.

Inventories Grope for Turnaround Level

"CUSTOMER INVENTORIES are about as low as they can go. Buyers are placing increasing emphasis on delivery times." Those statements from SKF Industries Inc., Philadelphia, were matched 8 out of 10 times in a STEEL survey concerning the status of inventories in durable goods industries.

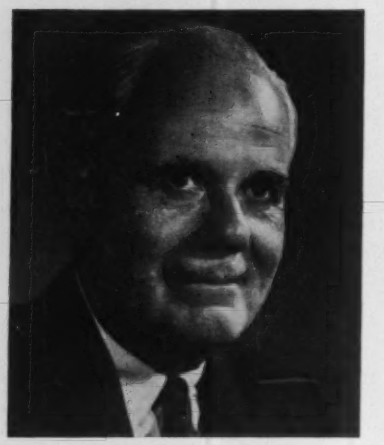
Raw material and finished product inventories stand at low to average, with most manufacturers holding comfortable levels. However, some company executives told STEEL that a 10 to 15 per cent increase in orders would create inventory hardships in their operations. With business at a depressed level, it will take only a slight nudge in industrial consumer demand to start a turnaround in the inventory trend.

• **What's Ahead?**—The prognosis for the accumulation of business inventories is good. The U. S. Department of Commerce reported manufacturers' durable goods inventories dropped from a June peak of $32.2 billion to hit $30.7 billion in December. The pace of inventory reduction slackened in January to a preliminary, seasonally adjusted annual rate of $30.6 billion. Similar phenomena were manifest in 1958 and 1954 when inventory depletion galloped downhill at a rate of about $300 million to $500 million per month. Then buyers hollered "whoa" and the pace slowed to $100 million. In each case, one month after the $100 million mark was set, inventory depletion bottomed out and accumulation resumed. (See chart.)

• **Hand to Mouth**—With customers clamoring for quick deliveries, a fastener maker in New York has had to keep a rounded inventory of steel products, but he maintains a "buy as you use" policy. A steel buyer in Baltimore reported he doesn't look for an early tightening in mill deliveries, although, the time may not be far off when missing a rolling at a supplier's mill would force him to buy elsewhere. "Our inventories of steel are near bottom, even at current production schedules," said W. R. Kunkel, general manager, Boston Gear Works, Quincy, Mass. "Distributors and users will not permit inventories to decline much below present levels," he noted.

The Mother Hubbard situation is accented by the fact that most buy-

Armco President Cites New Order Upturn



THE COMPLETION of inventory reductions by users of steel is showing up in the number of orders flowing into the Armco and Sheffield Divisions of Armco Steel Corp.

The development was revealed by Armco's president, Logan T. Johnston, in Cleveland where he addressed a marketing group.

Although orders are increasing in number, they continue to be modest in size.

Notably lacking are orders from the automotive industry.

Noting a seasonal pickup and a government push in construction, particularly roadwork, Mr. Johnston said: "The sky is brighter for us as we look into the spring."

• **95 Million Ton Year**—The upturn in steel demand will be gradual, though, Mr. Johnston explained. He expects U. S. production this year to approximate 95 million tons of ingots. Concurrent with the strengthening in demand for steel, Armco called back 250 furloughed employees at its Middletown, Ohio, Kansas City, Mo., and Houston plants. (Around 20 per cent of Armco's 40,000 employees have been on layoffs.)

Part of the employees called back are doing construction work at the company's plants. Armco has embarked on a five year, $341 million capital expenditures program. Projects costing $100 million have been completed, and work is underway on another $100 million phase.

• **Tailored Products Accented**—The $341 million program is aimed at increasing efficiency and broadening product lines, rather than increasing capacity. The traditional emphasis on producing sheer tons of steel is rapidly diminishing, Mr. Johnston asserted. In its place is a new accent on more sophisticated steels tailored to meet more exacting requirements.

When questioned about the possibility of price increases, Mr. Johnston said: "For competitive reasons, I don't want to see steel prices go up. We don't want to price ourselves out of the market."

He explained, though, that with increases in steelworkers' wages "it's going to be difficult to keep from raising prices."

INVENTORIES . . .

ers now stress and get immediate delivery on orders. Evidence: One purchasing agent in the stamping industry placed a phone order for metal and the stock was delivered the next morning before a confirming order could be typed and mailed.

• **The Gamut**—A fastener maker in Pittsburgh said he was "starting to order steel again, buying as much as we're using." A bearing manufacturer reported: "A year ago, we had an eight to nine month inventory of steel. We actually ended the (steel) strike with more steel than we had at the start. Now our inventory is normal, and we don't expect to reduce it any more." An Eastern fabricator of commercial refrigerators noted that his steel inventories "are the lowest in five years."

A Cleveland stamper said that his customers are ordering in larger quantities than they did two months ago. The larger lots are ordered mainly to get price breaks, he said. In Detroit, a tubing supplier said that one of his customers in the appliance business has less than a five day supply of a reasonably critical tubing. He commented that the low price of copper is keeping users from stocking inventory. "They'll probably limp along until copper prices go up, and then they'll order in quantity," he said.

Despite a seasonal upturn, some companies are carrying marginal supplies. A construction equipment maker in Illinois said that a slight increase in orders would make his inventory situation difficult in a few items. Farm equipment makers have been complaining to one bearing company that deliveries have been slow.

• **New England Comments**—Like most producers of castings in New England, Joseph Abusamra, president, Belcher Malleable Iron Co., Easton, Mass., points to pressure for deliveries as indicative of low inventories. Roderick Washburn, president, Plainville Casting Co., Plainville, Conn., agrees: "Consumers want shipment almost overnight . . . foundry backlogs are low, but so are stocks of consumers."

Out of the Midwest comes this February business survey from the Purchasing Agents Association of Chicago. One-third of respondents reported that inventories have been reduced in the last 30 days, a condition which has prevailed since mid-1960. Production levels increased for the second consecutive month in the Windy City; one-quarter of the reporting members had larger backlogs in February; for the twelfth consecutive month, vender deliveries offered no problems. Another indicator: Prices were also firmer.

• **What's Moving?**—In a spotcheck, STEEL's editors were told that dur-

ing the last three weeks, upturns had been noted in the incoming order rate for parts going into business and office machines and equipment, farm equipment components, electrical products, gas and electric lift trucks (especially for the government), construction equipment, air conditioning and refrigeration components, pleasure boats, pneumatic and hydraulic equipment, foundry machines, valves.

Offsetting those increases, which were pegged at "slight" to "good," are the lows in automotive and appliance business. None of the companies surveyed by STEEL saw any bright spots that would indicate a bulge in orders from those two fields.

• **Appliances**—Kelvinator Div. (Detroit), American Motors Corp., says it has a 2.4 month inventory of appliances—the industry's inventory is estimated at nearly four months.

One appliance maker in Chicago tries to buy a set amount of steel each month to care for normal peaks and valleys. His buying pattern hasn't changed in 18 months. He reports dealers are buying hand to mouth.

In January, factory sales of autos dropped sharply. At the same time, dealer inventories were reduced, which brought supply and demand closer to a balance. Last month, the auto industry turned out about the same volume of cars as its dealers sold (360,000). With about 400,000 units scheduled this month, and a chance of accelerated car buying, there's hope that auto component suppliers will start moving goods and rebuilding inventories soon.

In this period, the key is the consumer, whether industrial, retail, or wholesale. By keeping inventories lean, and shifting the inventory burden to suppliers, many companies have been able to weather the recession in fair shape. A general shift upward in consumer demand could put those companies and their suppliers in a real pinch. One of the brightest notes in a gloomy winter was sounded when the Commerce Department announced retailers trimmed inventories $300 million in January. Total stocks in manufacturing, wholesale, and retail were reported down $400 million. With only a minor increase in orders across the board, the bind could be on.

Better Metals Hold Key To MHD Generator's Future

POSSIBILITY OF commercial, electric power generation through the magnetohydrodynamics system with up to 60 per cent efficiency (vs. 40 per cent for conventional systems) was forecast last week in New York.

The efficiency estimate was made by Dr. Arthur Kantrowitz, vice president, Avco Corp., New York, and director of Avco-Everett Research Laboratory, Everett, Mass. Avco and 12 electric utilities will spend $1.2 million this year developing the MHD system.

Avco reports that 205 kilowatts of power have been produced in its new MHD generator Mark II. That is 20 times greater than the power output achieved when the project was first revealed late in 1959.

MHD is a direct power generation system in which a 5000° F ionized gas stream shoots through a magnetic field, acting in the same way as a solid armature revolving in a conventional generator.

Dr. Kantrowitz says that performance in the experimental generator is now "almost good enough to be economical if it were scaled up."

• **Problems Remain**—Earlier in the month, at a symposium on engineering aspects of MHD at the University of Pennsylvania, Dr. Kantrowitz told STEEL these problem areas offer challenges to metalworkers:

• Components that will endure high temperatures.

• Engineering solutions to containment problems.

• Steels for the regenerator or heat exchanger that will work at 2000° F and higher in an oxidizing atmosphere.

Dr. L. Steg, manager, Space Sciences Laboratory, Philadelphia, General Electric Co., says that new materials not now developed will be needed. Some metals now used in MHD last only for moments.

L. M. Gearhart, senior electrical engineer, Martin Co., Baltimore, reports that his company is developing instrumentation and measuring devices for MHD which must closely follow development of MHD technology.

Kaiser, USW Extend Labor Pact One Year

KAISER STEEL CORP. and the United Steelworkers of America have signed an agreement to extend their present labor contract for another year. It was due to expire June 30.

The pact calls for an hourly wage adjustment (about 8½ cents) for about 8000 employees on Oct. 1. All basic steel employees will receive a general 7 cent boost. All other employees will receive comparable increases.

Starting Jan. 1, 1962, the company will begin paying 90 per cent of the costs of the California Unemployment Compensation & Disability Benefit Law for production and maintenance employees and all the costs for the clerical and technical force.

For the duration of the agreement, there will be no change in the cost of living adjustments, except that effective Jan. 1, 1962. (The company shall pay the same cost of living adjustments as are then being paid under union contracts with the other big steel producers.)

The new contract expires June 30, 1962, the date that union contracts terminate with other major steelmakers. If an agreement between the USW and the other companies is not reached by that date, the Kaiser contract will automatically continue in effect for 60 days.

AS AUTOMATION ADVANCES . . .

Production Workers Decline in Proportion to Total Employment

	1950			1959		
	Total Employment (In thousands)	Production Workers (In thousands)	Percentage of Production Workers	Total Employment (In thousands)	Production Workers (In thousands)	Percentage of Production Workers
Primary Metal Industries	1,200	1,036	86.3	1,137.7	916.4	80.5
Fabricated Metal Products	973	810	83.2	1,069.0	831.6	77.8
Machinery (except electrical)	1,354	1,043	77.0	1,611.7	1,134.1	70.4
Electrical Machinery	877	670	76.4	1,241.6	839.7	67.6
Transportation Equipment	1,264	1,036	82.0	1,670.8	1,189.5	71.2
Instruments	248	184	74.2	338.9	222.3	65.6
METALWORKING TOTALS	5,916	4,779	80.8	7,069.7	5,133.6	72.6
TOTAL MANUFACTURING	14,967	12,317	82.3	16,167.8	12,237.0	75.7

Source: U. S. Department of Labor.

States Can Help Retrain Workers

HELP WANTED signs will hang outside hundreds of factories in 1970 as thousands of young workers wear out their shoes in a futile search for jobs.

That grim prediction will come true, say government labor experts, unless: 1. Job seekers acquire higher skills through better training at vocational schools. 2. Displaced workers are retrained for new jobs and helped to migrate, if necessary.

During the sixties, 26 million young Americans will start hunting employment—40 per cent more than the 18.5 million who entered the labor force in the last decade.

This year, about 2.2 million new workers will be hunting jobs—hardly an encouraging prospect when unemployment is hovering at 5.7 million, the highest level since 1941. When business improves, many, but not all, workers will be recalled. Unemployment won't fall back to prerecession levels any more than it did after the slumps of 1954 and 1958. Reason: Automation and improved technology are constantly boosting industry's capacity to produce more goods with fewer men (see table above).

• **Pennsylvania Leads** — Industry, labor, and government officials are showing increasing interest in a program started in Pennsylvania in 1951.

The co-operative project involves local school districts and state departments of Public Instruction, Public Assistance, Labor & Industry. The program provides brief intensive training for unemployed and underemployed adults. Objective: "Equip recipients of public assistance and other unemployed with the basic skills and technical knowledge required for entrance into a local industry."

In the last ten years, the state has provided training for 14,924 people in 29 counties at a cost of about $1 million, or $66 per person. Thirty-eight occupations have been taught, including aircraft mechanics, auto body repair, bricklaying, carpentry, diesel mechanics, machine tool operation, pipefitting, plumbing, power sewing machine operation, television service, sheet metal fabrication, and welding.

Last year, 1981 unemployed Pennsylvanians enrolled and 1604 completed training—of whom 1442 (89.9 per cent) were placed on jobs within 15 days of the date that training ended. Operating costs were $160,246, or $80.88 per person.

• **Programs Pay Off** — "The programs more than pay for themselves because 15 per cent of the people we train come off the public assistance rolls," says Harold W. Williams, executive director of the Department of Labor & Industry's advisory board on problems of older workers. "We're able to get jobs for such a high percentage of the trainees because we find out in ad-

vance what a community's job requirements are," he adds. "Employers tell us what they need and agree to hire the people when they're trained. We're not permitted to continue a program unless we know that we can place 60 per cent of the people within 15 days of the date that they complete their training."

Unemployment in Pennsylvania is currently about 500,000—or 11.3 per cent of the labor force, and all but three of the state's 12 major labor market areas have "substantial" numbers out of work.

In Philadelphia, where thousands have been laid off, there's a need for auto body repairmen, auto mechanics, gas station attendants, waiters, waitresses, appliance repairmen, machinists, and power sewing machine operators. In Pittsburgh, there's a need for auto, appliance, and television repairmen.

• **Needed: More Schools**—Pennsylvania is doing almost all its training at vocational high schools, sending unemployed adults to evening classes and reimbursing local school systems. Officials say these facilities are inadequate.

Last year, the Department of Public Instruction surveyed 3137 businesses and industries and found: 1. Almost 70 per cent of the firms expect their need for well trained and highly skilled workers to increase during the sixties. 2. Only 32 per cent have organized, in-plant training programs in operation. 3. Part time adult courses would be of value in upgrading or retraining present employees. 4. It's difficult to obtain technical workers below the engineering or professional levels. 5. Students who do not go to college should receive occupational training before leaving high schools.

To meet those needs, the department wants to set up a state-wide network of area technical schools which high school students would attend on a half time basis—studying nonvocational courses at their home schools and taking instruction in shop and laboratory work at the technical centers. Adults and out-of-school youth would attend the technical centers so that they could retrain for employment or qualify for advancement.

"We have the knowhow to train or retrain, but we have a serious shortage of buildings and equipment," says Dr. Alfred W. Beattie, superintendent of Allegheny County schools (suburban Pittsburgh). The bill (S. 987) introduced to the U. S. Senate on Feb. 20 by Sen. Joseph S. Clark (D., Pa.), the "Vocational Retraining Act of 1961," won't solve the problem, Dr. Beattie believes. Reason: It provides only operating funds and payments for subsistence and transportation to people who are being trained. It specifically excludes capital funds for buildings.

• **Douglas Bill** — State officials are hoping for Congressional passage of a bill which they believe will do them more good—the "Area Redevelopment Bill" (S. 1), introduced to the Senate on Jan. 5 by Sen. Paul H. Douglas (D., Ill.). It would allow the Secretary of Health, Education & Welfare to assist the states in providing "such additional facilities or services" as might be needed for vocational training and retraining. But it has limitations: People must be retrained so that they can "qualify for new employment in the redevelopment area in which they reside or were last employed."

Some labor experts are convinced that unemployed workers will have to be retrained for jobs without regard to geography.

• **Case in Point**—Last year, West Virginia set up a pilot program for 100 jobless men in the hard hit, coal mining town of Welch. Eighty completed six months of vocational school training in welding, machine shop, carpentry, and mine machinery repair. Jobs were found for 41 of the pilot group, but 39 of the men had to leave the state.

Reconciled to the idea that migration may be the only recourse for some of its citizens, West Virginia is pushing ahead this year with its first program aimed specifically at retraining the unemployed. About $400,000 will be disbursed in the fiscal year ending June 30 for the training of 2000 jobless people.

Dynamics of Growth Require Some Individuals to Shift Occupations

"Opportunities for learning new skills are available, and more can be provided by schools and employers. But the responsibility for seeking out and taking advantage of these opportunities cannot be taken away from the individual," stresses Jack S. Parker, vice president, General Electric Co.

"Our program offers educational or retraining opportunities for eligible employees to acquire new skills affording opportunities for new jobs within or outside the company. If the employee is laid off, he can get financial assistance for new education or retraining outside the company, or for seeking work with other employers (one week's pay for each full year of service in excess of three years). This 'income extension' feature offers the individual a variety of options, so that he can make his own decision about his future."

To get better utilization of senior managers' brainpower, permit them to work as long as they want, yet provide younger managers more opportunities, Consultant Ewing W. Reilley suggests older managers . . .

- ***Take on planning functions***
- ***Take top jobs with small firms***
- ***Enter education, government service***

Start Planning 'Second Career' at 50

LIFE CAN BEGIN at 55, 60, or even 65 for the manager who chooses a "second career" instead of retirement. That's the purpose of a plan with this three pronged goal: 1. Making better use of American brainpower. 2. Making it possible for a man to go on working as long as he wants to. 3. Easing the pressure of spiraling welfare costs.

The Plan: A company-sponsored counseling program that has as its goal an active, useful role (in business, government, or social service) for the manager after "retirement."

• **How Plan Works**—Leading proponent of the concept is Ewing W. Reilley, a director of McKinsey & Co., New York, and one of the early disciples of management development. The plan hinges on a philosophy that's simplicity itself, yet revolutionary. Explains Mr. Reilley: "I see no more reason why a man should continue doing the same thing after age 50 or 60 than I do his continuing as an adult what he did as an adolescent."

At age 50 to 55, a manager could start his "second career" planning. Clinics, supported by participating companies and run in co-operation with top universities, could be set up in major cities. Their purpose: To counsel and work out with managers a "second career" plan taking into account the individual's desires and the company's needs.

• **Second Careers**—What directions could this "second career" take? It might mean a different role for the manager within his own company. "Even within corporations which are giving top responsibility to young men, there are probably unrealized needs for older people in advisory, judicial, and other elder statesmen roles," says Mr. Reilley.

Some older managers would be ideally suited for a function that's all too often pushed aside in the bustle of daily affairs — creative

planning. "There is a need for people who can be truly objective in their decisions and recommendations," says Mr. Reilley. "Anyone engaged in the day-to-day competitive battle is not in a good position to evaluate many sensitive corporate issues."

Senior planning managers, immune from the ordinary corporate pressures, could work on such problems as: How can we better manage this firm? What are the long range projects we should be working on? How can promotion and compensation best be handled?

A manager's "second career" might be as a consultant to his company—perhaps in the training of younger managers.

Another direction for the "second career": From large company to small business. Many big corporations have an overabundance of top talent but there is often a desperate need in smaller companies for these people. A manager would not necessarily need the same amount of money he made formerly, explains Mr. Reilley. Because he's older, his needs are probably less. And, he's receiving a pension.

Some smaller firms have made it a profitable practice to hire their top management and scientific talent from among the ranks of the retired.

• **Entirely Different Field?**—Society has enormous needs which have not been fully met, such as high caliber, responsible people in education, social service, and government, says Mr. Reilley. For example, there is a vital need for more teachers. If a company were to allow a manager to begin his pension earlier, say in his 50s, he might be able to live well on what he would get as a teacher. That concept could also be applied to staff and key positions in nonprofit and professional organizations, suggests Mr. Reilley.

• **Problem and Challenge** — The plan gains added practicality when you look at some of the compelling reasons why the status quo can't be maintained. First: There is nothing magic about age 65 that requires a person to retire. But, in the average, well established, well run firm today there is no longer as great a need for the older executive in traditional functions. With executive development programs running along at a fast clip there are pressures for earlier retirement.

Industrial Relations Counselors Services Inc., New York, recently made a depth study of the subject. It found: The overwhelming consensus of managers is for a mandatory retirement program even though skilled people will be lost. Managers are concerned about losing many of those people, but they believe the long range interests of the company are best served by a formal retirement system, explains Richard Beaumont, associate director of research. Their reasons: 1. Without a planned program there's no way of determining what future staff requirements will be. 2. Younger executives must be given a chance.

Mr. Reilley believes that by postponing retirement we may restrict the opportunities for younger people and not basically solve the problem for older ones. Under the "second career" plan, a man would be free to move when he's about 55 (with pension) and the company would be free to separate him. In that way, the actual retirement age would become less important.

The trend today seems headed towards younger mandatory retirement ages.

VOICE-POWERED TELEPHONE carried by this life-lined worker greatly reduces his chances of getting hurt while working in fume and hazard filled areas. Coworker stands a safe distance away to relay tools, materials, instructions. Such equipment (Maskfone, made by Mine Safety Appliances Co., Pittsburgh) is widely used in blast furnace areas like this one at Republic Steel Corp., Cleveland, where conventional telephones are impractical

Preretirement counseling is much farther along in the area of blue-collar workers. A growing number of companies have initiated such plans, ranging all the way from half hearted pokes at the problem to detailed comprehensive programs. All too many of them, though, are designed to help the worker adjust to his forthcoming leisure time rather than to counsel him on a "second career."

Some type of "second career" program is needed. Look at these figures. Today more than 36 million Americans are in the 45 to 64 age group. About 16 million are 65 years or older. That's 1 in every 11 persons — double the number of 25 years ago. By 1975 (out of a total projected U. S. population of 235 million), 44 million will be in the 45 to 64 age group and 22 million in the 65 and older group.

Thanks to better care, people are living longer. Of the men born in 1890, only 42.4 per cent lived to age 65 and only 27 per cent have a life expectancy of 75. But, of the generation born in 1950, 76.7 per cent can expect to reach age 65, and 57.6 per cent age 75. A man of 65 today can expect, on the average, to live for 14 more years.

"This is a social problem and a social opportunity," says Mr. Reilley. "Today we are holding people in jobs where we don't need them while there are crying needs for these talents elsewhere. Too, there are a growing number of people over 65 without sufficient funds and—equally important—the psychological satisfactions of doing useful work and being needed. This could boomerang on business in the form of legislation."

• **A Prediction**—Will the concept of "second careers" be accepted? Mr. Reilley believes so. "In 1940, management development was as little recognized as the 'second career' is today. Actually, the 'second career' is just an extension of career planning beyond executive development. Within a few years, it will be as widely accepted as management development is now."

• *An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.*

Defense's Use of Negotiated Contracts Hit . . . Broad Subpoena Powers Hidden in Proposed Commission

REPRESENTATIVE HEBERT

The chairman of the Special Investigations Subcommittee of the House Armed Services Committee has hit the Defense Department with new charges of unwarranted spending. Rep. F. Edward Hebert (D., La.) wants to "slam the door shut" on the Defense Department's use of negotiated contracts in lieu of competitive bidding.

The congressman says he has the support of another longtime foe of Defense mismanagement, Rep. Carl Vinson (D., Ga.), chairman of the full Armed Services Committee. They are upset over reports showing that 86.2 per cent (based on valuation) of defense contracts awarded in fiscal 1960 were negotiated. They charge that ten companies and their subsidiaries received 36.1 per cent of the value of the contracts. Only 4.5 per cent was formally advertised, they say.

The only exceptions to the competitive bid rule which would go into effect if the representative's bill passed Congress:

1. In areas declared by Congress to be of the nature of a "national emergency."
2. Where formal advertising for bids would cost the government more.
3. When a negotiated contract might help small business participation in defense contracts.
4. If a contract went into a "major distress area."

The bill would also outlaw contracts containing profit formulas unless the contractor certified cost data were current and accurate. Bills like this have come up in Congress often, and gotten nowhere, but if full support should develop in the Armed Services Committee, the outlook could change.

● **KENNEDY STALLS ON LEAD-ZINC**—Two days of hearings of Rep. Ed Edmondson's (D., Okla.) subsidy bill for small lead and zinc miners has failed to produce a witness from the Interior Department. The subsidy program proposed is regarded as the first real test of President Kennedy's intentions of helping the depressed mining areas.

Alexander Christie, United Steelworkers' legislative representative, told the House Mining Subcommittee that the $4.8 million a year cost was little enough to aid the small miners and was preferred to tariffs or quotas. The union thinks tariffs and quotas bring windfall profits to large producers, whereas the Edmondson Bill is restricted to 2000 tons of each metal in one year.

Observers this year believe a lead-zinc subsidy measure can breeze through the Senate, once the House has passed it.

Automation Hearings Start Today

Rep. Elmer J. Holland (D., Pa.) starts hearings today (Mar. 20) on the relationship between automation and unemployment. His ad hoc Subcommittee on Unemployment is a part of Rep. Adam C. Powell's (D., N. Y.) House Education & Labor Committee. Hearings will run to the middle of April with more than 30 witnesses expected, including equal representation from management, labor, and the "public." Some top union leaders and economists have said they will show up. Many industry board chairmen and presidents invited to appear remain uncommitted, although it seems certain two presidents from Detroit may appear and at least one top steel executive. With the IUE's Jim Carey certain to be on tap, an electrical industry spokesman will probably appear too.

It seems that invitations went to labor leaders and the "public" first, so industry spokesmen may not be on the witness stand until the unions have gathered the opening headlines.

Representative Holland, an old steelworker, has a bill in the hopper he wants the hearings to cover. The bill proposes to provide for "the gathering, evaluation, and dissemination of information, and the formulation of plans, which will aid in the maintenance of a high level of prosperity."

● **THE FINE PRINT**—On the surface the "Commission on Continuing Prosperity" sounds a little like President Kennedy's own Labor-Management Advisory Committee headed by Secretary of Labor Arthur Goldberg. But the guts of the Holland Commission are in the fine print of the bill, which says: ". . . the commission may administer oaths and affirmations, subpoena witnesses, compel their attendance, take evidence, and require the production of any books, papers, correspondence, memoranda, or other records deemed relevant . . ." In other words, Representative Holland is seeking power the Senate Antitrust Committee has never tried to obtain, and only recently has the Justice Department obtained in one General Motors antitrust suit (STEEL, Mar. 6, p. 32). The bill calls for a fine of $1000 or one year's imprisonment or both if a witness before the commission fails to respond.

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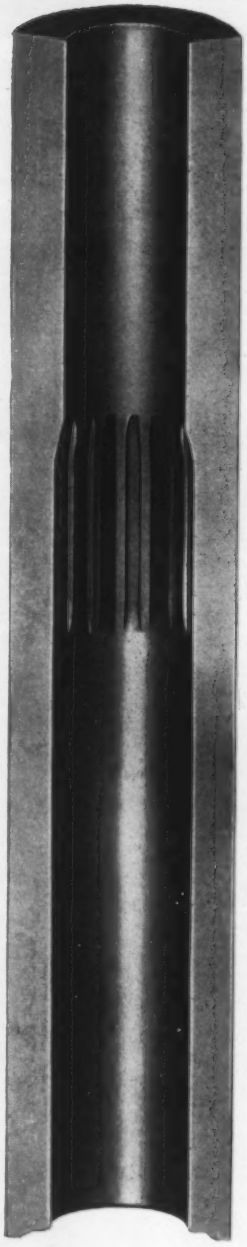

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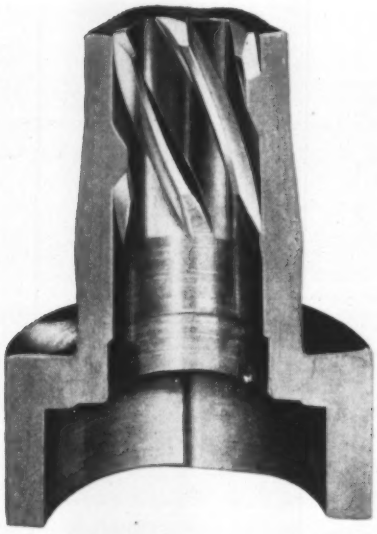

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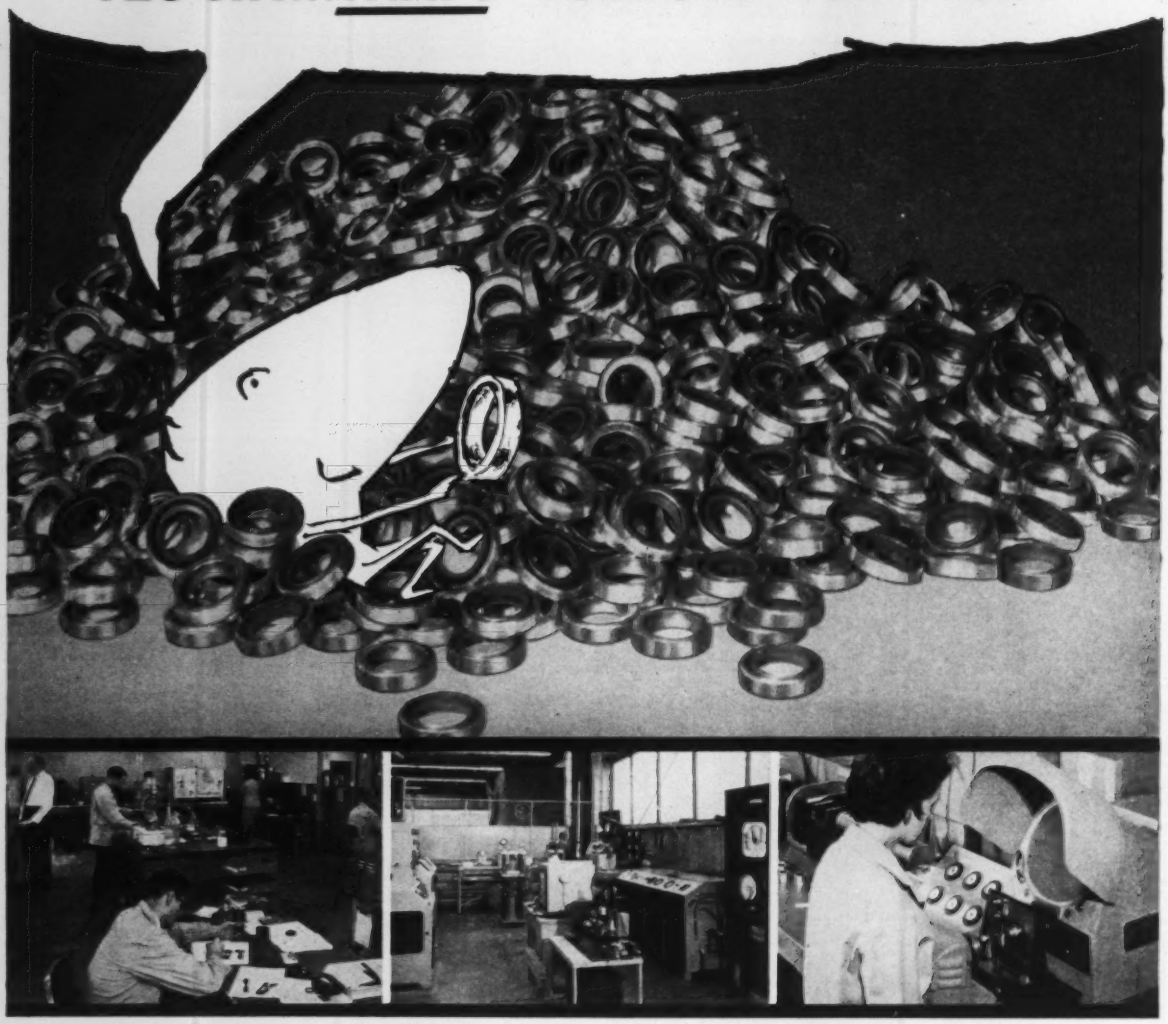

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Bristol, New Hampshire P1

Why Borgward Failed in Auto Market

	1960	1959	1958
Total West German Car Output . . .	1,821,800	1,501,800	1,306,200
Borgward Group Production . . .	88,800	93,900	79,000
Borgward's Percentage of Total	4.87%	6.25%	6.05%

THE BANKRUPTCY of West Germany's Borgward automotive group cannot be taken as a symptom of a recession in the German automobile market. It's just a shining example that boom conditions and full employment are no guarantee against personal failure.

Sales of the Borgward Isabella and Arabella, Goliath, and Lloyd fell in 1960, while the firm's German competitors experienced large increases. In addition, Borgward's export program faltered and was deemed a complete failure in the U. S.

The group is owned and run by Dr. Carl F. W. Borgward, said to be one of the ablest automotive engineers and designers in Germany. But his lack of marketing knowhow and inability to decide what kind of car to produce brought about his failure.

• **Too Many Models?**—Dr. Borgward competed in the small car market with his Lloyd and Goliath. Though smaller than the Volkswagen, the cars were never as inexpensive nor as appealing and thus lost favor with the consumer who at least aspired to a VW.

When Borgward produced the Isabella, buyers preferred the comparable yet less costly Opel Rekord and Ford Taunus. If they wanted a bigger car, they drove a Mercedes.

Last year, the "in between" Arabella was introduced. It was a beautiful car but couldn't match the performance of the Volkswagen or slightly more expensive cars.

• **Production Fiasco**—Each of Borgward's German competitors concentrates on one general type of automobile. And where more than one model is manufactured, they run off the same assembly line. Borgward, however, was in the market with several completely different types of motor cars with no interchangeable parts and no true mass production.

• **Ford to the Rescue?**—The future of the Borgward group is undecided. The firm is now in "informal" receivership.

The city of Bremen cannot afford a complete breakdown of its largest factory. So the Bremen Senate has established a corporation to take over the company's assets and plan a financial reorganization. That may mean a complete shift of control from the Borgward family—perhaps to Ford in Cologne which is suffering from a capacity shortage. Some preliminary negotiations were conducted before Christmas.

• **Finances**—Some people regard the Borgward situation as only a liquidity crisis combined with the inability to meet the payroll for 20,000 workers. But current debts equal $31.2 million while share capital, including reserves, totals only $3.6 million. And about $16.8 million is tied up in inventory of thousands of unsold cars, 12,000 of which are at Bremen alone.

British Automakers Note Upturn

Recovery in Britain's automobile industry has started much sooner than most observers had expected. Ford and Standard have returned to a five day week and British Motors Corp. has put on an extra shift, although about 40,000 of its 60,000 employees are still working less than five days. Improvement has also been noted by automotive suppliers.

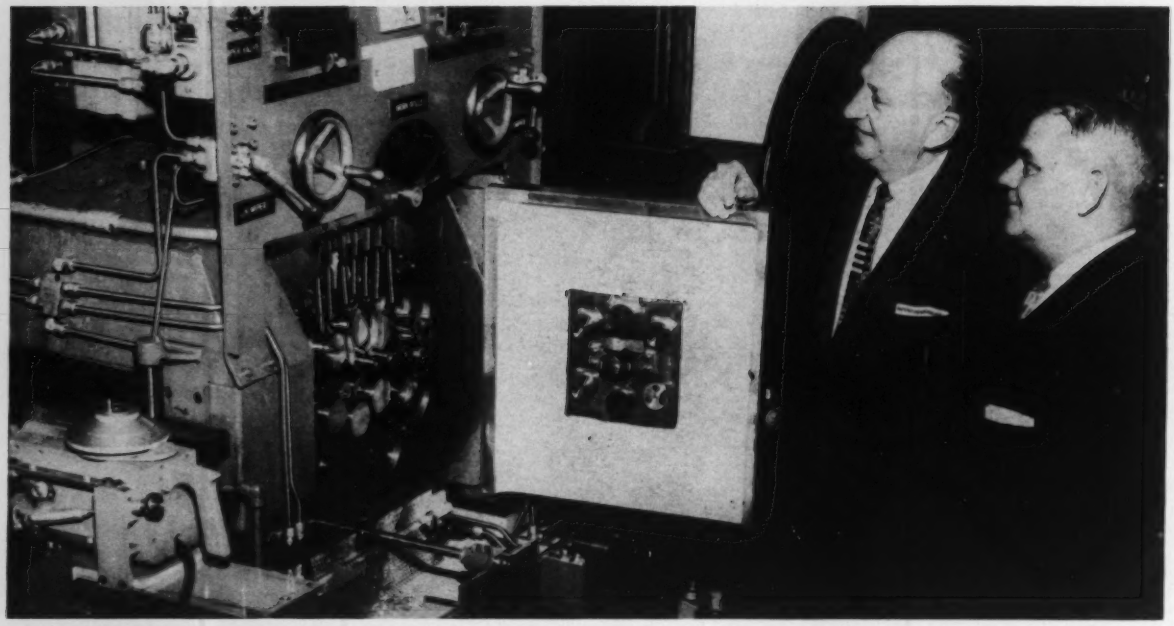
Automakers are calling for more steel. And although sheet mills cut output early this year, there is not likely to be any steel shortage. Stocks are higher than they have been for some years.

U. K. Steps Up Denationalization Drive

The British government has offered investors $238 million worth of state owned debentures and preference stocks of seven U. K. steel companies. It's the largest single marketing operation ever undertaken in Britain. The move marks another step in the Tory administration's eight year old effort to divest itself of the nation's steel industry which the Socialists nationalized in 1951.

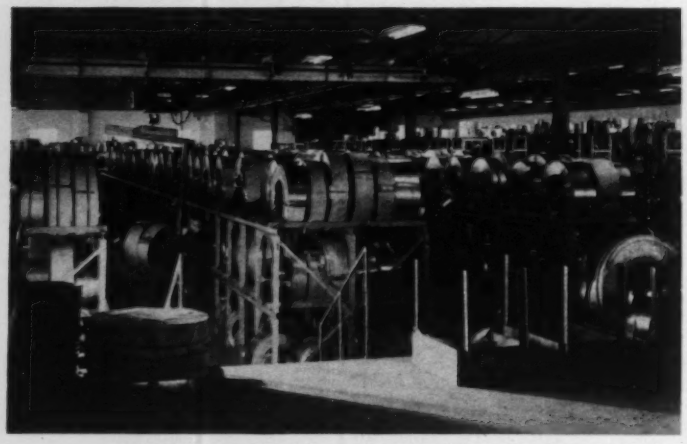
French Market Seen Lucrative

The upsurge in France's industrial production, a rising standard of living, increased foreign exchange holdings, and virtual elimination of restrictions against dollar goods imports add up to a wide open market for U. S. goods, reports the Department of Commerce.



Fred Ulbrich (right) shows visitor how Z-mill . . .

Rolls Supermetals to Customers' Specs



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EVER NEED a pound or two or ten of stainless or a superalloy rolled to your precise requirements?

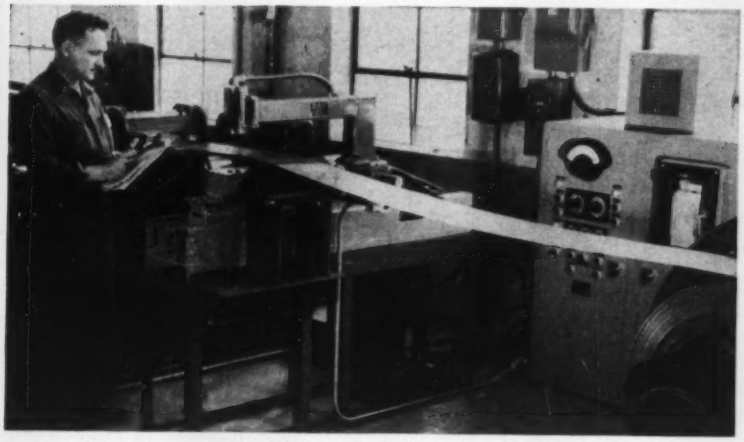
Thousands of metalworking companies do. They are the market for a unique specialty strip mill in Wallingford. Conn. It's operated by Ulbrich Stainless Steels Inc.

Fred Ulbrich likes to call his plant the "biggest little mill in the country." While his company has grown steadily (employment exceeds 100), he resists the temptation to go after large production, low profit orders. The majority of orders are small, often for a few pounds.

o Man of Vision—The story of Ulbrich Stainless Steels is essentially the story of Fred Ulbrich, a happy

Succession

"When I go away, business goes up," says Fred Ulbrich in bragging about how his sons are moving into the business. Fred C. Ulbrich Jr., left, is vice president-sales, Richard J. Ulbrich is vice president-production. A third son is in college.



X-ray guarantees close gage tolerances

and friendly man. Anticipating the specialized demand of various stainless types in a wide range of applications, Fred Ulbrich left the employ of a local silversmith to start his own company in 1924.

He realized that he would need specialized knowledge. During his early years, he spent long days working in the plant, then drove to New Haven to attend night courses in metallurgy at Yale University.

• **Special Equipment**—As the demand for custom rolled stainless grew, Fred Ulbrich bought additional equipment. Today, the Ulbrich shop is completely modern. It has two Sendzimir mills, a bright anneal furnace, two high and four high planishing and reducing mills, x-ray gaging equipment, a battery of specialized slitters, edging and flattening machines, and a dancing file machine developed and built by Ulbrich engineers to assure burrfree material.

Demand for specialty strip with rounded edges has led the company to introduce equipment for rolling strip from stainless wire, eliminating the necessity for precision rounding of slit strip.

The growth of the electronic and missile industries has helped the growth of Ulbrich, although it serves a wide variety of industries.

• **Business Philosophy**—"We've come a long way since 1924. All along the line, we have catered to the customer who wanted small quantities of high quality material custom rolled to his exact specifications. Sometimes when business was slow, we were tempted to go after the big quantity stuff. But we resisted. It's pretty hard to imagine us turning down an order because it's too small," says Mr. Ulbrich.

"Our business is built on the idea of special service. We carry more than 2 million lb of stainless and many of the supersteels in stock. We have more than 12,000 coils of materials. So when we get an order for some highly specialized strip, we have the raw material . . . and are ready to give the customer exactly what he wants promptly.

"We've followed the Yankee philosophy of expanding. We never bought anything we could not pay for. But we have been able to get just about all the lastest equipment we need as we need it. We worked with Waterbury Farrel in developing our Sendzimir mills and with other suppliers in designing or adapting other equipment. Sometimes we made our own."

Fred Ulbrich is gradually turning over control of the business to two sons associated with him. He is now on a vacation cruise abroad.

"They'll probably double the business by the time I get back," he predicted when he left.

Steel Casters Strive To Maintain '59-'60 Level

Wilson H. Moriarty, president Steel Founders' Society of America

"PRODUCTION of steel castings in 1961 should remain at the 1959 and 1960 levels," predicted Wilson H. Moriarty, president of the Steel Founders' Society of America in Chicago last week. Production last year was close to 1959's 1,413,000 tons.

Noting that bookings in early 1961 have equaled last year's average, Mr. Moriarty says that production is expected to increase in the third quarter. A marked upturn is expected in the last quarter. The industry thinks the pickup will be preceded by a second quarter decline.

Steel foundry bookings for January reflected an increased demand Mr. Moriarty attributes largely to the pickup in highway construction which has stimulated construction equipment production, a good customer for castings. Railroad ordering, which accounts for a large percentage of steel casting sales, is expected by some companies to aid in holding sales in 1961 at the 1959-60 level. C. E. Grigsby, vice president, American Steel Foundries, Chicago, estimates that railroads will order 35,000 to 40,000 new freight cars during the year ending Sept. 30, 1961; that would approximate the previous year's total.

While the society's member companies generally agree on the sales trend for 1961, there are divergent opinions on whether the pickup during the second half will be sufficiently strong to bring the annual total up to 1960's level.

• **Market Comments** — Texas Foundries Inc., Lufkin, Tex., anticipates a 25 per cent increase in production in 1961. The company expects increases in the automotive and heavy construction equipment industries and a decline in sales to the oil field equipment manufacturers resulting from oil imports. Oklahoma Steel Castings Co., Tulsa, Okla., looks for a stepup in demand from ordnance, road building machinery, and agricultural equipment industries.

W. A. Kimble, manager, Service Foundry, Avondale Shipyards Inc., New Orleans, with 63 per cent of its production marked for the shipbuilding industry, estimates that his company's production this year will drop to 60 per cent of the 1960 tonnage. Spokesmen for two firms, National Malleable & Steel Castings Co., Cleveland, and McConway & Torley Corp., Pittsburgh, whose major markets are the railroads, state they expect a drop in production this year.

• **Pressure Pouring**—In American Steel Foundries' new laboratory at Bensonville, Ill., technicians are finding new uses for controlled pressure pouring, a method of casting developed by the company to make steel wheels for freight cars. Ten ton batches of steel are poured into slabs 14 ft long, 3½ ft wide, and 5 in. thick. The process has also been used to make bimetal castings. Companies that have rolled the slabs into sheets for auto bodies, refrigerators, stoves, bathroom fixtures, and table tops are enthusiastic about the results. At ASF's Indiana Harbor Works, East Chicago, Ind., shell molded steel castings in the 300 lb range are being produced commercially. A 65 lb valve was recently redesigned and produced by the method, reducing weight to 54 lb. Several companies report they expect quality, weight, and cost saving advantages to broaden the shell molded castings market.

Unitcast Corp., Toledo, Ohio, has started production of high alloy castings following extensive research on improvement of ductility factors in steels with tensile strengths of 200,000 psi or more.

More than 15 per cent of the steel castings produced in 1960 had tensile strengths of more than 90,000 psi; wider use of heat treating to strengthen castings is expected. It is likely that efforts to assure closer dimensional tolerances will continue also.

New Burroughs Computer Handles Algebra, English

A new electronic data processing system which accepts programs written in algebra and English has been introduced by Burroughs Corp., Detroit.

Called the B5000, the system permits full use of a computer with a minimum of human intervention and allows system expansion without costly reprograming. The same program is said to run equally well on a small, medium, or large B5000 system because the computer recognizes the addition or deletion of system parts and automatically adjusts to the new configuration, explain officials.

Matched programs need not be run for current operation. While printing the results of one job, the computer can compute other entirely different problems and take in raw data on still another task.

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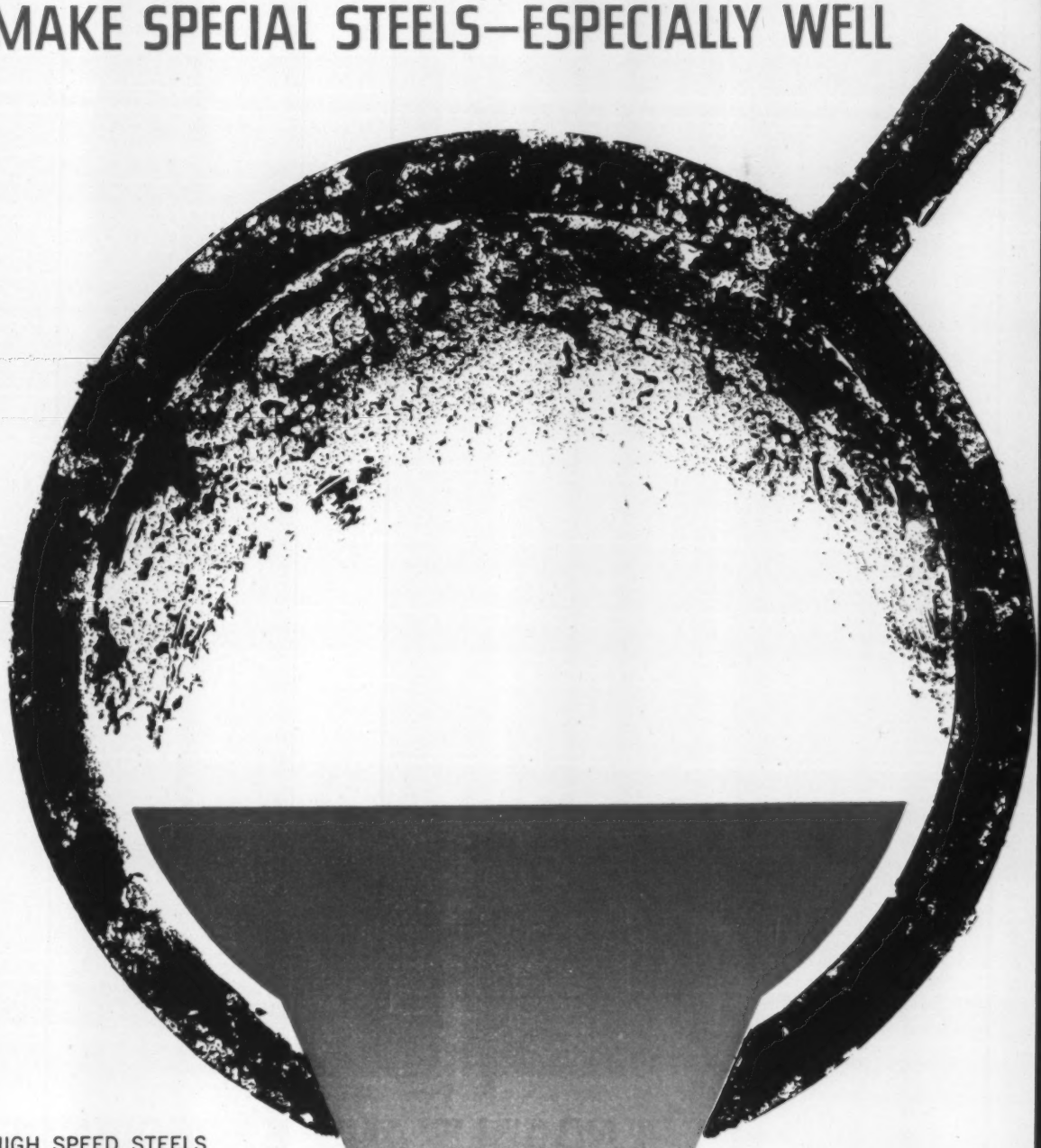

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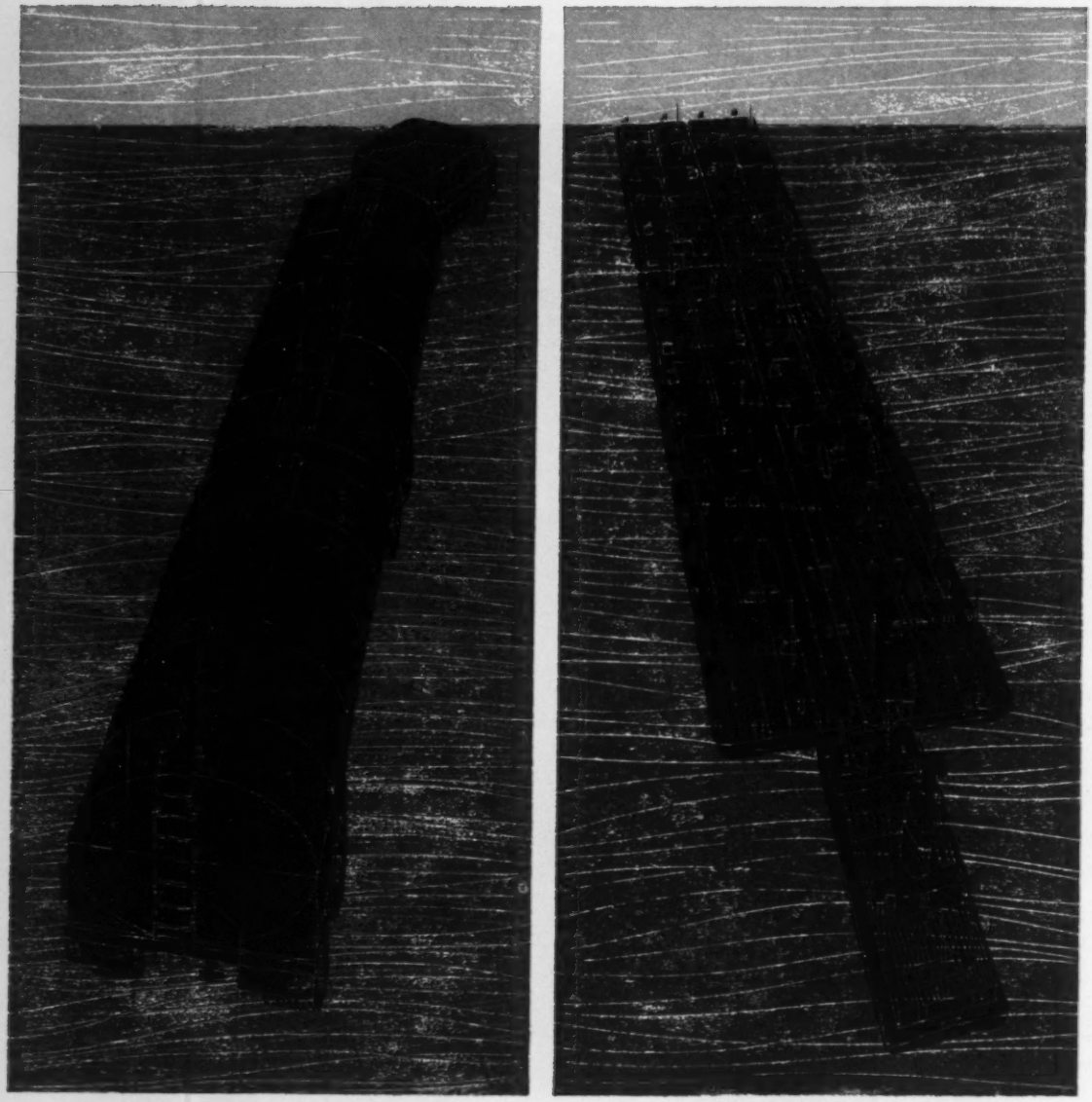

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April Upturn in Truck Sales Expected

PRODUCTION
(Thousands of units)

	Big Five		Independents	
	1961	1960	1961	1960
JAN.	62.1	104.1	19.4	18.3
FEB.	61.0	100.1	23.7	27.8
MAR.	67.0	90.7	31.0	28.8

Source: Adapted from *Ward's Automotive Reports.*

SUPPLIERS SAY April releases from truck builders indicate they anticipate a slight increase over March production projections, which are tagged at 98,000 units. The biggest gains are expected in heavy duty and compact trucks. Although the news is encouraging, first quarter production is still running 32 per cent behind year ago levels.

The sales pattern since the first of March generally shows a steady increase from one ten day period to the next, but, at best, company reports indicate that industry sales have climbed no more than 10 per cent since the first of the year.

Some makes are doing particularly well. Ford says it still is carrying back orders on Econoline vans and buses. The company accounted for 33.5 per cent of the truck market earlier this year, says John McLean, division truck marketing manager. And Ford's output through mid-March has held up better than that of other Big Five members (65,000 vs. 79,000 a year ago). By contrast, Chevrolet and GMC Truck & Coach are doing only about half as well as they did a year ago. Edward N. Cole, Chevrolet's general manager, is still projecting 10 or 15 per cent gains in trucks, as well as cars, over January levels. He says: "I am confident industry sales for the second, third, and fourth quarters will equal if not exceed those of 1960."

• **Competition** — Truckmakers are also running into legislative headaches that could hurt sales. President Kennedy wants to increase taxes on heavy trucks because he doubts that they are paying their fair share of highway costs. He has recommended raising the tax on diesel fuel from 4 to 7 cents and raising the tax on trucks over 26,000 lb from $1.50 to $5 per 1000 lb. He also suggested higher taxes on heavy truck tires and tubes.

If the boosts are put through, they will put even more pressure on truck freight rates. The auto haulaway business, for example, has already been hard hit by railroad piggybacking techniques—railroads haul cars cheaper than truckers can if the distance exceeds 400 miles.

• **Counterattack**—The truck industry has been conducting a vigorous campaign by showing fleet owners how they can cut operating costs. For example: Improved highways and liberalized load and length limits have increased potential truck capacity.

Part of the problem, say officials: Integrating packaging, warehousing, and material handling methods into the truck transportation business.

J. W. Millard, manager of GMC Truck's transportation productivity research, says better attention to the science of moving goods could save the truck transportation industry $15 billion a year. He adds that selecting the least expensive vehicle is of prime importance. "First cost isn't always the lowest cost. True cost is arrived at by totaling original price, operating, and

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maintenance costs, then subtracting resale value and dividing the balance by ton miles it has traveled," he explains.

Maintenance is another overlooked area. Proper attention to hidden maintenance factors could save many fleet owners a cent a mile, suggests Mr. Millard. Here are a few tips for fleet owners:

1. Study operating records before setting specifications for new equipment so you can spot constant repair items.

2. Look ahead to make sure your power train is adequate in case legal load limits change, or if there will be a change in the type of cargo your fleet will be hauling.

3. In selecting tires, be familiar with load and road conditions. A 15 per cent overload will cut tire life by 25 per cent.

4. High labor costs for maintenance can be saved if you buy extra capacity in items like air cleaners and clutches which won't have to be cleaned or adjusted frequently.

5. Write detailed orders for repairs and parts. Servicemen won't waste time figuring out what's wrong.

Ford Studies Torque Box Frame Concept for Big Cars

A compromise in the controversy over unit bodies vs. frames may be in the making. It's the integral frame or wide hip design. The center frame section is moved outboard into the rocker panels where it's welded to the body structure. Torque box frame members transfer body and suspension loads from the narrow front and rear sections to the wide center section of the still separate frame.

The design permits the lowering of the front floor and the creation of a passenger section that's comparable in size to areas made available via full unit or monocoque construction, where reinforced body panels help carry the structural load.

The possibility of the compromise on some larger cars cropped up at an SAE meeting held in Detroit last week. Donald N. Frey, product planning manager, Ford Div., commented: "A new frame concept in the form of torque box arrangement has potential for Thunderbird and Lincoln cars. The merits of this type frame for these cars (both are unitized now) remains unknown from a production standpoint." Translated from Detroitese, that means: Ford has thoroughly tested the approach, and it may be used —if it's no more costly to build.

Despite some contrary opinions expressed by frame builders, Mr. Frey reasserts that unitized construction is still the most economical body building method for compact cars. He adds that it inherently provides a more efficient vehicle arrangement but says that for cars 55 in. or lower and weighing more than 3200 lb, there's little difference in the design costs of unitized versus body and frame cars.

Those comments open the door to some interesting speculation about what may happen to future Ford designs. Motordom has been of the opinion for some time that the Ford Div. will switch its bigger cars to unitized construction in 1963 when the cost of nonperishable tooling for the present body is fully amortized. And it looks like Ford has evaluated such a move. In pointing out that the change is costly if cars are already in production, Mr. Frey remarks: "The magnitude of the problem is easily visualized by studying the requirements for switching the Ford which is being produced in plants that have been equipped to build frame cars. The change would obsolete a frame plant, bring about extensive changes in many assembly plants, and require revisions to other facilities."

The sum of Mr. Frey's comments leaves a strong impression that Ford will change its body design and that it may switch to the integral torque box frame instead of to a fully unitized body as had been anticipated earlier.

Let's Kill This Rumor

● **Rumor**—Ford will announce the Cardinal in about two months. This car is much less predictable than the swallows of Capistrano. It flew off to Europe last year and nobody is quite sure when it will return, but May seems to be too soon.

The best information available still follows this line: The car will be built first in Ford's Cologne, Germany, plant—and maybe in England. It will have a 97 in. wheelbase, front wheel drive, and a V-4 engine. Styling is said to follow traditional European lines. The car, which is aimed at the European market, will appear as a 1962 model.

If U. S. market conditions warrant it, Ford is prepared to import the drive train components and assemble a slightly different version of the car in this country. Here it will have a 99.5 in. wheelbase and use an extended body shell. Sheet metal will be slightly restyled. Contrary to some reports, the U. S. version is not expected to use the Falcon engine and transmission. That would be awkward if it were laid out for front wheel drive.

U. S. Auto Output

Passenger Only

	1961	1960
January	414,498	688,731
February	364,397	659,323
March	.....	654,242
April	.....	582,909
May	.....	611,226
June	.....	613,147
July	.....	434 377
August	.....	305,527
September	.....	407,685
October	.....	617,816
November	.....	597,132
December	.....	522,239
Total	.....	6,694,354

Week Ended	1961	1960
Feb. 11	88,006	153,186
Feb. 18	76,523	158,898
Feb. 25	100,331	153,501
Mar. 4	92,024	138,513
Mar. 11	92,819†	145,967
Mar. 18	70,000*	145,852

Source: *Ward's Automotive Reports.* †Preliminary. *Estimated by STEEL.

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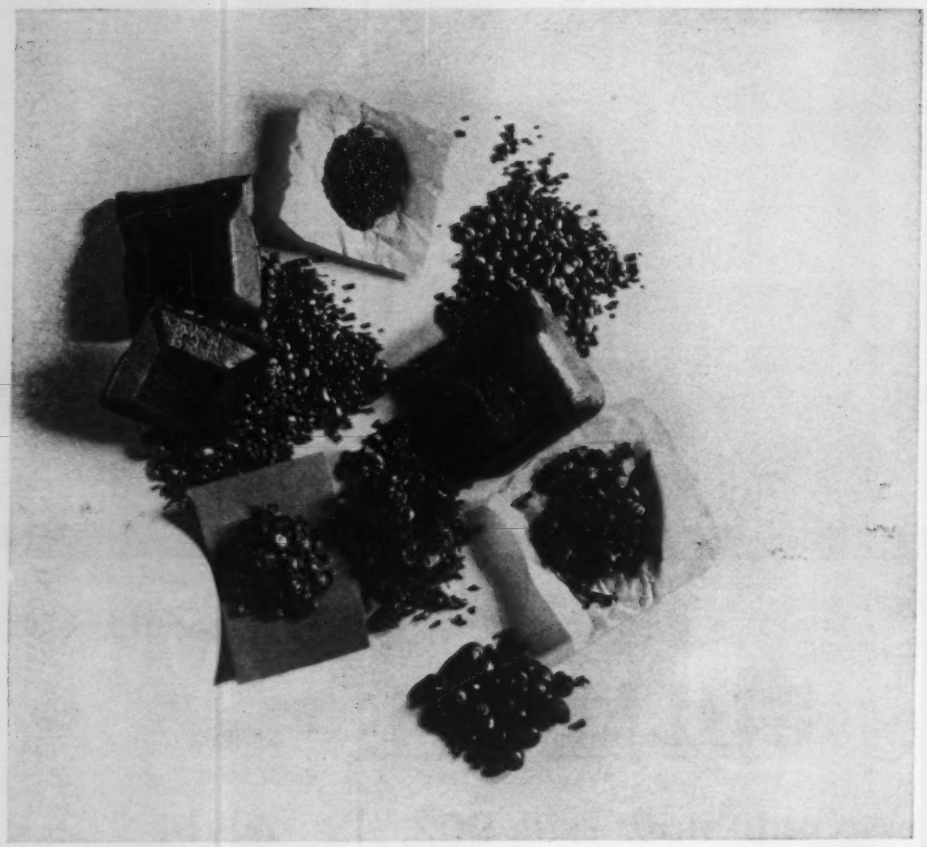
ASARCO ALLOY ADDITIVES



Improved alloys at less cost with "ready to add" master alloys

Asarco alloying materials, produced under strict metallurgical controls, reduce alloying costs, improve casting performance, and contribute substantial savings in subsequent production costs.

BISMUTH is used to improve the dispersion of graphite in malleable iron castings. Available in shot, pellet and ingot forms.

SELENIUM improves machinability of stainless steel, controls its porosity. Asarco master alloys include ferro-selenium and nickel-selenium containing 50-60% selenium, and selenium powder.

TELLURIUM is used for degasifying, to minimize porosity, and improve machinability of stainless steel. It is also used for producing hard chilled iron castings. Ferro-tellurium containing 50-58% tellurium is available in chunk form. Tellurium is also available in powder, stick, slab and tablet forms.

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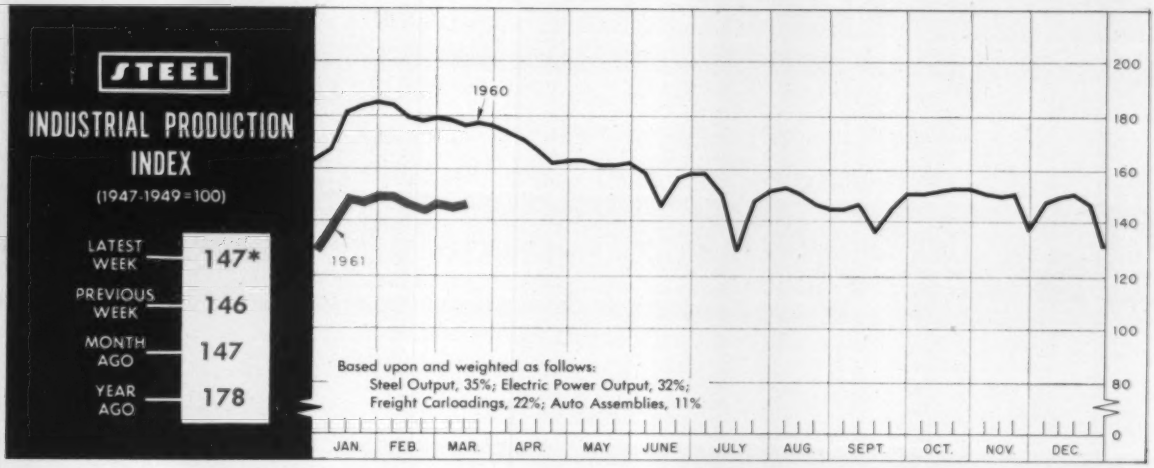
PHOSPHOR COPPER used as a deoxidizer, in shot or waffle form, improves castability, assures sharper detail, reduces porosity.

OTHER ALLOY ADDITIVES produced by Federated are: Aluminum, Arsenical Copper, Chromium Copper, Copper-Nickel Shot, Manganese Copper, Silicon Copper, Titanium Aluminum, Copper Magnesium, Copper Shot, Cadmium Copper, Copper Iron, Aluminum Copper.

For complete information, write on your company letterhead to: Federated Metals Division, American Smelting and Refining Company, 120 Broadway, New York 5, New York.

ASARCO



*Week ended Mar. 11.

Upturn to Be Marked by New Factors

"SOME UPTURN in the economy during the latter part of the year is probable. Although business in the first half should continue to be sluggish, we will not move from the high level of activity on which we have been perched for the last six months," believes Dr. Jules Backman, research professor of economics, New York University. (He recently expressed his views on the subject before the Associated Industries of Cleveland.)

• **Bones of Contention**—Dr. Backman says a balancing of the major factors of the economy suggests his projection. He believes the factors reveal neither marked strength nor marked weakness. Dr. Backman makes these observations:

• *State and local spending* continue to expand at an annual rate of about $3 billion annually. Voters approved $3.2 billion of tax exempt bond proposals last November. A continued expansion in that area seems to be assured.

• *Personal income* after taxes rose steadily until the fourth quarter, with a fractional decline in recent months. While there has been a small reduction in labor incomes, it has been largely offset by government payments for old age security and unemployment. Expenditures for services should continue to rise and smaller purchases of durable goods will be offset by larger purchases of nondurables.

• *Residential housing* starts fell from an annual rate of about 1.6 million in the spring of 1959 to 984,000 in December, 1960, then rose to 1.1 million in January. Conditions favor a continuation of easier credit, so housing starts will probably rise from the current depressed level in 1961.

• *New plant and equipment expenditures* reached a peak during the second quarter of 1960. Since then, they have continued to decline. Although a decline of several percentage points is probable dur-

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	1,570[1]	1,580	2,607
Electric Power Distributed (million kw-hr)	14,300[1]	14,226	14,271
Bituminous Coal Output (1000 tons)	6,180[1]	6,575	7,799
Crude Oil Production (daily avg—1000 bbl)	7,100[1]	7,241	7,049
Construction Volume (*ENR*—millions)	$365.3	$405.6	$284.5
Auto, Truck Output—U. S., Canada (*Ward's*)	124,057[1]	119,553	184,818
TRADE			
Freight Carloadings (1000 cars)	500[1]	501	560
Intercity Truck Tonnage (changes from year ago)	+3.5%	−6.3%	−6.9%
Business Failures (Dun & Bradstreet)	408	348	299
Currency in Circulation (millions)[2]	$31,794	$31,766	$31,613
Dept. Store Sales (changes from year ago)[2]	+26%	+11%	−17%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$28,744	$30,334	$22,378
Federal Gross Debt (billions)	$290.5	$290.2	$290.5
Bond Volume, NYSE (millions)	$48.9	$43.4	$33.1
Stocks Sales, NYSE (thousands of shares)	29,026	27,103	15,980
Loans & Investments (billions, adjusted)[3]	$109.6	$109.2	$101.6
U. S. Govt. Obligations Held (billions)[3]	$30.3	$30.3	$25.4
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	212.5	212.2	231.1
All Commodities[6]	119.7	119.8	119.7
Commodities Other than Farm & Foods[6]	128.2	128.2	128.5

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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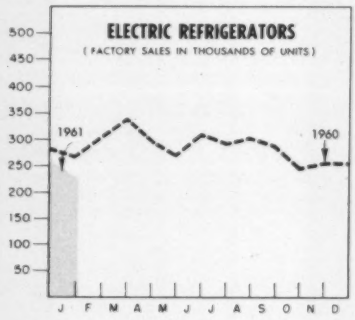
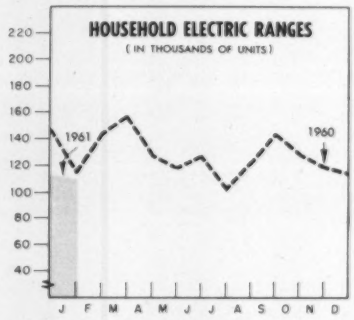
THE BUSINESS TREND





	1961	1960	1959
Jan.	225,700	266,700	256,200
Feb.	.....	302,400	306,200
Mar.	.....	338,100	333,700
Apr.	.....	294,000	301,000
May	.....	268,000	308,200
June	.....	308,500	361,000
July	.....	291,500	370,800
Aug.	.....	301,400	314,100
Sept.	.....	284,900	355,700
Oct.	.....	244,200	329,600
Nov.	.....	253,300	265,900
Dec.	.....	253,000	282,600
Totals	.....	3,406,000	3,785,000

National Electrical Mfrs. Assn.
Charts copyright, 1961, STEEL.

Total Factory Sales—Units

	1961	1960	1959
Jan.	109,400	115,000	120,800
Feb.	.....	143,200	134,600
Mar.	.....	156,400	172,600
Apr.	.....	127,000	136,100
May	.....	117,600	133,400
June	.....	126,200	151,400
July	.....	102,100	129,200
Aug.	.....	122,400	116,600
Sept.	.....	142,800	157,200
Oct.	.....	127,900	143,400
Nov.	.....	118,400	144,000
Dec.	.....	113,500	147,500
Totals	.....	1,512,500	1,686,800

National Electrical Mfrs. Assn.

ing the first half of 1961, the latest government survey reveals plans for 1961 point to a mild increase in capital expenditures in the latter half of the year.

• *Inventories* swung from an accumulation rate of about $11.5 billion in early 1960 to a liquidation rate of about $3 billion in the last quarter. Most of the adverse effects of the inventory adjustment have already taken place. While some further inventory liquidation is probable, he says inventories should shift into a plus factor late in the year. (See story, Page 61.)

• *Exports* rose sharply in 1960, while merchandise imports remained at about 1959 levels. The excess of exports over imports reached the highest level in the postwar period, except for 1957 which was overstimulated by the Suez crisis. However, cautions Dr. Backman, some decline in exports will not be surprising because boom conditions abroad have shown signs of tapering off.

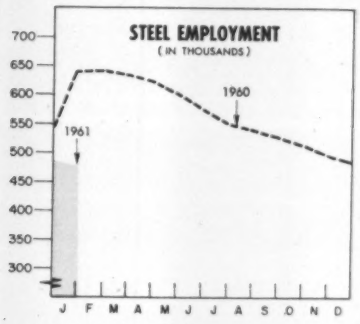
• *Federal spending* has been inching upward in recent months. It is probable that a further rise of several billion dollars will take place this year as the new administration seeks to achieve its announced goals and as armament spending mounts.

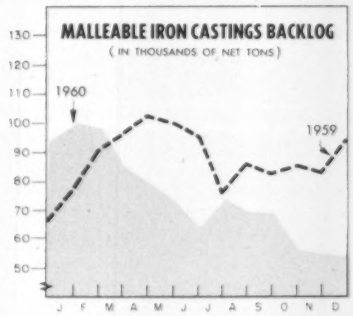
• *Unfilled orders* of manufacturers, which have declined, bear careful watching for clues to the underlying strength of the economy, advises Dr. Backman.

• *Credit* has been eased by the Federal Reserve since early 1960. Steps have been taken to increase the reserves of member banks. The rediscount rate has been reduced twice. Mortgage money was available this winter in somewhat larger supply than it was a year ago, but interest costs have not yet declined significantly. Efforts being made to reduce long term interest rates should have some modest effect, but a major decrease is not anticipated by Dr. Backman.

• **New Factors Emerge**—In evaluating the outlook for 1961, the economist says he believes it is important to recognize that several factors not present in earlier postwar years have emerged in the last year or two. He points out that:

• *Competition* among domestic companies and from abroad has intensified. The earlier postwar shortages have given way to surpluses. At present, there is no urgent need for new capacity to meet short run demand.





	Employment In Thousands		Payroll In Millions	
	1961	1960	1961	1960
Jan.	478	641	$274.5	$398.8
Feb.	...	643	....	381.4
Mar.	...	637	....	398.8
Apr.	...	626	....	357.2
May	...	604	....	339.8
June	...	580	....	316.0
July	...	554	....	287.0
Aug.	...	543	....	300.3
Sept.	...	531	....	287.2
Oct.	...	516	....	284.8
Nov.	...	499	....	270.4
Dec.	...	486	....	267.9

American Iron & Steel Institute.

	Shipments		Unfilled Orders*	
	1960	1959	1960	1959
Jan.	83.2	73.2	100.3	77.3
Feb.	83.1	74.7	98.3	90.3
Mar.	86.2	84.3	84.7	95.8
Apr.	71.3	91.0	79.2	102.5
May	68.9	83.5	73.2	99.9
June	72.6	85.5	63.9	95.3
July	49.9	69.2	74.3	75.3
Aug.	58.8	65.1	69.9	85.9
Sept.	63.0	76.1	69.0	82.3
Oct.	63.5	75.5	56.6	85.0
Nov.	63.0	58.2	56.6	82.6
Dec.	57.2	80.1	54.7	93.9
Total	820.7	916.4		

*For sale. U. S. Bureau of the Census.

• *Inflation* has been contained. On the average, wholesale prices have remained unchanged for three years and consumer prices have risen only modestly. The incentive to build plants and stocks of materials today because they will cost more tomorrow has been dampened.

• *The balance of payments* shows an accumulation of large credit balances by foreigners and a large outflow of gold. Lowering of interest rates may be accompanied by an accelerated outflow of gold, resulting in a loss of confidence in the stability of our economy.

• *Labor costs* have been increasing and management's attitude has been getting tougher. Increases can no longer be easily passed on to the consumer as they were after World War II.

• *Outstanding credit* (private debt) jumped from $139.9 billion in 1945 to $547.5 billion in 1959. In light of their large inventory of durable goods, consumers may be reaching the point where further expansion of debt will slow down significantly. A reduction in the rate of debt creation would create a situation not present in our economy in earlier postwar years, believes Dr. Backman.

• *Narrower profit margins* have resulted from those factors, points out Dr. Backman. Such a development could curtail expansion because such funds have played an important role in financing new capital investment.

• **The Slow Upturn**—Those six factors, emphasizes Dr. Backman, have contributed to the sluggishness of the economy in the last two years and help to explain the lack of exuberance in the recovery after 1958's recession. They have affected our growth rate and in turn the ability to create new job opportunities for our expanding labor force. That is why, month after month, both employment and unemployment have risen higher than a year earlier.

• **Could Build Sound Base**—The six factors indicate a modified economic environment in which business decisions will be made over the next year or longer, Dr. Backman surmises. On the balance, they could result in a sounder basis for longer term economic growth than that which prevailed in the last 15 years. Nevertheless, he cautions, such an environment would eliminate some of the yeastlike elements which have been important in recent years.

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SCOTT H. PATTERSON
Anaconda American Brass post

G. A. MAY
Allen Mfg. exec. v. p.

WILLIAM F. BOHANNAN
Denison Eng. plant mgr.

Lester E. Brion Jr. succeeds **Russell B. Barnett,** retired, as president of **Peter A. Frasse & Co. Inc.,** New York. Mr. Brion was executive vice president.

Scott H. Patterson, vice president, Mideastern region, **Anaconda American Brass Co.,** assumes duties of **Kenneth G. White,** vice president, Central region, when he retires Apr. 1. Mr. Patterson's new title will be vice president, Central-Mideastern regions. He will have offices both at Buffalo and Detroit.

S. Ralph Shaffer was named general manager; **L. B. Geithman** general sales manager, Metals Processing Div., **Curtiss-Wright Corp.,** Buffalo.

Roland W. Johnson, vice president of **Foote Bros. Gear & Machine Corp.,** Chicago, was given the additional duty of administrative assistant to the president in marketing areas.

Harris Shapiro was appointed vice president-engineering, **Electro Dynamics Div.,** Bayonne, N. J., General Dynamics Corp. He was assistant division manager-engineering.

William P. Sharpe Jr. joined **International Resistance Co.,** Philadelphia, as marketing manager, high reliability resistors.

G. W. Snyder was made assistant to vice president-commercial and director of production control, **Crucible Steel Co. of America,** Pittsburgh.

G. A. May was appointed executive vice president and general manager, **Allen Mfg. Co.,** Bloomfield, Conn., subsidiary of Chicago Pneumatic Tool Co. He was general manager, Oil Tool Div. Mr. May succeeds **M. J. Mather,** resigning as chief officer of Allen.

Arnold L. Rustay was elected a vice president of **Wyman-Gordon Co.,** Worcester, Mass. He has been technical director since 1957.

Stephen A. Furbacher was elected executive vice president of **Kawneer Co.,** Niles, Mich. He was vice president of Kawneer's Mill Product Div. in St. Charles, Ill.

Rueven Platt was named vice president-marketing, **Rolled Steel Corp.,** Skokie, Ill.

Rene C. McPherson, former head of axle sales for Dana Corp., Toledo, Ohio, was elected president of **Hayes Steel Products Ltd.,** Merritton, Ont., partially owned Canadian affiliate.

Olaf Halvorsen was elected vice president, **American Steel & Aluminum Corp. of Massachusetts,** Cambridge.

Alfred A. Strelsin, president, **Cenco Instruments Corp.,** New York, was also elected chairman, following planned retirement of **John T. Gossett.**

D. L. McCuen was made product manager, Industrial Chemicals Div., **Pittsburgh Chemical Co.,** Pittsburgh.

William F. Bohannan, chief engineer, **Denison Engineering Div.,** American Brake Shoe Co., was made manager of a Denison plant soon to be erected in Marysville, Ohio. The new facility will produce hydraulic, axial piston pumps and valves.

J. B. Cowan was elected president of **Plasteel Products Corp.,** Washington, Pa. He succeeds **Dr. J. E. Rosenberg,** chairman, who previously filled both posts. Mr. Cowan was executive vice president.

George C. Cooper was named manager-reinforcing bar sales, Cleveland District, **U. S. Steel Supply Div.,** U. S. Steel Corp. He succeeds **Frank M. Waddell,** retired.

Reuben W. Pelto and **Norbert K. Hall** were made vice presidents of **Ready-Power Co.,** Detroit. Mr. Pelto is in charge of truck unit sales; Mr. Hall of air conditioning.

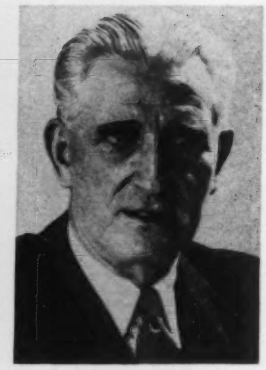
Frank O. Anderson II was made plant manager, American Foundry Plant, Indianapolis, **Chrysler Corp.** He was manufacturing manager of Chrysler's casting plant in Kokomo, Ind.

Roland C. Crans was made assistant chief engineer of **Holcroft & Co.,** Detroit.

J. W. Morgan was appointed director of marketing for **Consolidated General Products Inc.,** Houston.

Domenick Saponara was made chief engineer and **Robert Clark** was named manager, Advanced Design

LYMAN L. CAMPBELL
Package Machinery v. p.



IVON A. BAILEY
Inco (Canada) v. p.

JOHN T. McHUGH
Precision Drawn Steel post

FRANK X. WHITE
AMF International pres.

Group, at **Caloric Appliance Corp.'s** Research & Development Dept., Topton, Pa.

Lyman L. Campbell was elected vice president-engineering, **Package Machinery Co.**, East Longmeadow, Mass. He was executive vice president, general manager of Lynch Corp., Anderson, Ind.

Richard L. Hopkins joined **Accurate Specialties Co. Inc.**, Hackensack, N. J., as general manager. His prior experience includes a post as executive vice president of Mallory-Schwartzkopf Metals Corp., as well as executive duties in P. R. Mallory Co. and American Electro-Metal Corp.

Jack Driggs was appointed manager of wire rope sales for **Colorado Fuel & Iron Corp.'s** Western Div. He was wire rope sales manager, Mid-Continent Div. **Howard M. Dorward** was made product sales engineer, Wire Rope Sales Dept., Western Div. He was wire rope sales manager for the Rocky Mountain Div.

Ivon A. Bailey, chairman and chief officer of International Nickel Co. Ltd. of the United Kingdom, was elected a vice president of the parent company, **International Nickel Co. of Canada Ltd.**, Copper Cliff, Ont. **John O. Hitchcock**, managing director and second chief officer of the United Kingdom subsidiary, was elected an assistant vice president of the parent company.

Donald F. Limburg was made service metallurgist for **Jones & Laughlin Steel Corp.'s** Stainless & Strip Div., Detroit.

Thomas F. Gallagher was named general sales manager, **Davis Fire Brick Co.**, Oak Hill, Ohio.

William H. Jaynes was made general manager, Protective Coatings Div., **Pittsburgh Chemical Co.**, Pittsburgh. **B. J. Philibert** was made industry manager for the division.

Edgar M. Herold was made superintendent of **Kaiser Steel Corp.'s** merchant-skelp mill, Fontana, Calif.

John T. McHugh was made general plant manager, **Precision Drawn Steel Co.**, Pennsauken, N. J. He was division superintendent, wire and wire products, at the Donora, Pa., plant of American Steel & Wire Div., U. S. Steel Corp.

Frank X. White was made president of the newly formed International Div., **American Machine & Foundry Co.**, New York. He continues as a vice president of AMF. **Gordon O. Fraser** was made executive vice president of AMF International.

Edward H. DaCosta was elected president; **John M. Taylor Jr.** chairman of **Taylor Fibre Co.**, Norristown, Pa. Mr. DaCosta was vice president-marketing; Mr. Taylor president and treasurer.

Zeke R. Smith was named executive vice president and general manager, **Potter & Brumfield Div.**, Princeton, Ind., American Machine & Foundry Co. He replaces **H. L. Huntsinger**, who resigned to open his own manufacturers' representa-

JACK DRIGGS
CF&I wire rope sales

EDGAR M. HEROLD
Kaiser Steel mill supt.

EDWARD H. DaCOSTA
Taylor Fibre president

ZEKE R. SMITH
Potter & Brumfield exec. v. p.

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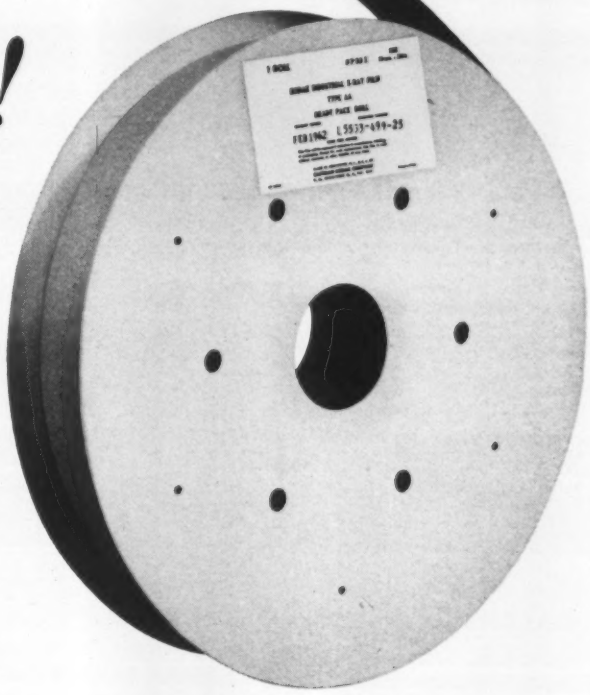

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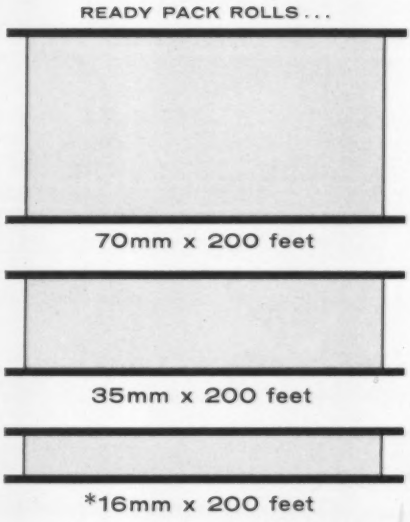

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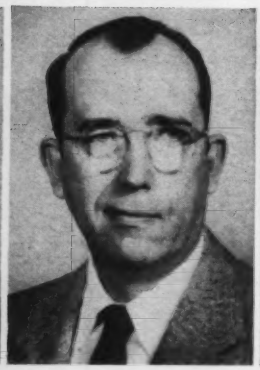


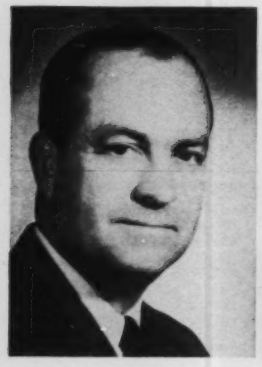
J. T. PITTS
Brown Instruments sales mgr.

GEORGE A. VERHAEGHE
Racine Hydraulics sales v. p.

JOHN A. ANTONEVICH
Blackstone research-dev. dir.

FRANK G. MILLER
Climax Molybdenum post

A. F. BOUCHER
Lincoln Electric sales



CHARLES H. SCHMINKE
U. S. Expansion Bolt v. p.

GEORGE F. BATESON JR.
Republic-Warehouse Div. mgr.

KENNETH A. MERZ
Torrington divs. eng. dir.

tive agency in the metropolitan New York area.

Charles H. Schminke was elected vice president, **U. S. Expansion Bolt Co.**, York, Pa. He continues as general sales manager.

Forest M. Palmer was made manager of sales development, **Aluminium Ltd. Sales Inc.**, New York.

George F. Bateson Jr. was made manager of **Republic Steel Corp.'s** Warehouse Div., Youngstown. He succeeds **Walter M. Bachtell**, retired.

Kenneth A. Merz was appointed director of engineering, Air Moving Divisions, **Torrington Mfg. Co.**, Torrington, Conn. He was engineering manager, Air Impeller Div.

Ralph R. Stoutimore, assistant works engineer, was promoted to works engineer of the Kansas City, Mo., plant of **Sheffield Div.**, Armco Steel Corp. He replaces **H. W. Gronemeyer**, retired.

J. T. Pitts was made sales manager, **Brown Instruments Div.**, Philadelphia, Minneapolis-Honeywell Regulator Co. Formerly Southwest regional manager, Dallas, he succeeds **J. A. Robinson**, who joins the company's six-division Industrial Products Group.

George A. Verhaeghe was named vice president-sales of hydraulic products for **Racine Hydraulics & Machinery Inc.**, Racine, Wis., a new post. He was in charge of hydraulic sales.

John A. Antonevich was made director of ultrasonic research and development for **Blackstone Corp.**, Jamestown, N. Y. **Robert H. Swick** was made product engineer in research and development; **Gordon L. Johnson** product engineer, Ultrasonic Div.

Frank G. Miller was promoted to plant manager at the Langeloth, Pa., plant of **Climax Molybdenum Co.**, a division of American Metal Climax Inc. He was assistant general manager-operations. **Ralph C. Toerper** was made assistant director-research and development at the Langeloth plant.

A. F. Boucher was named general sales manager, **Lincoln Electric Co.**, Cleveland. He was assistant general sales manager. He succeeds **J. S. Roscoe**, now on market development assignments.

OBITUARIES...

Kuo-Ching Li, 68, president, **Wah Chang Corp.**, New York, died Mar. 7.

James S. Ervin, 75, a director of **E. W. Bliss Co.**, Canton, Ohio, and former president of Mackintosh-Hemphill Co., now a division in Pittsburgh, died Mar. 7.

William T. Welch, 71, chairman, **Ajax Flexible Coupling Inc.**, Westfield, N. Y., died Mar. 12.

M. E. Marsh, assistant vice president, Operations Div., **Wheeling Steel Corp.**, Wheeling, W. Va., died Mar. 12.

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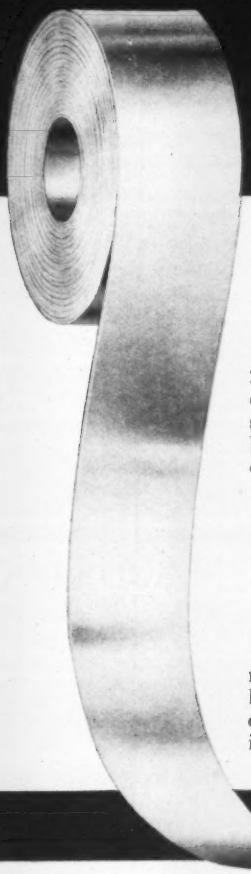

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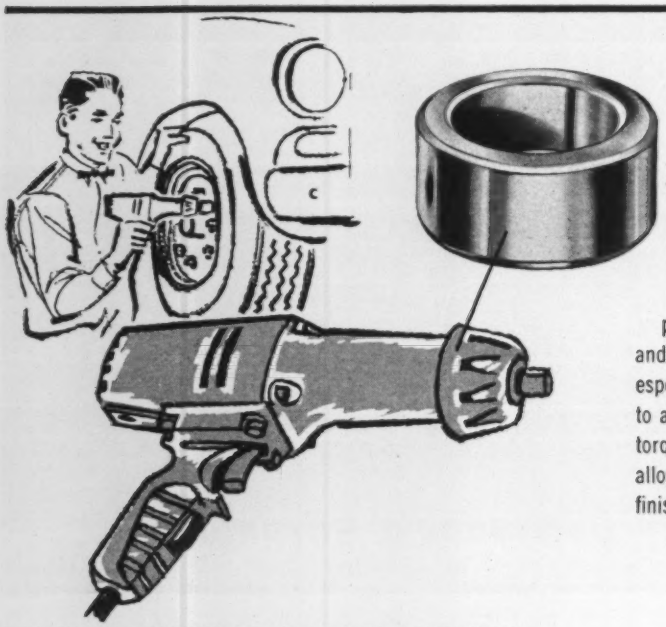
THE FORGEABLE BEARING ALLOYS THAT STAND UP ON THE REALLY TOUGH JOBS!

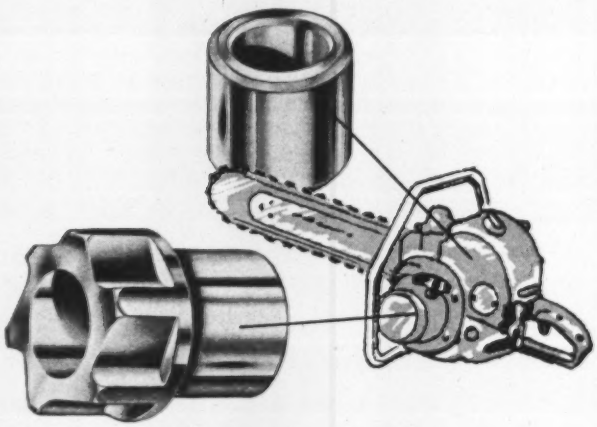


600 ALLOY NOSE BEARING WITHSTANDS THE PUNISHING SHOCK LOADS OF AN IMPACT WRENCH

This heavy-duty impact wrench takes the rigorous punishment of hard industrial use right on the nose . . . and right on the 600 Series nose bearing. This bearing was especially chosen by the manufacturer because of its ability to absorb a range of 1600 to 1800 impacts per minute at a torque of from 0 to 250 foot pounds. By specifying 600 bearing alloy, the manufacturer gets superior performance from his finished product.

600 ALLOY RATCHET AND DRIVE GEAR BEARING TAKES THE TERRIFIC POUNDING OF A HIGH POWERED CHAIN SAW

Professional woodcutters give chain saws a rough time for hours on end, all year round, and these rugged saws must be built to take punishment. With chain speeds up to 3000 feet per minute, the ratchet and drive gear bearings, for example, must have a very high strength, hardness and good resistance to wear with minimum lubrication. That's why 600 Series Alloy was specified for both parts . . . the ratchet is a forging and the bearing was produced from 600 Series rod.



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326

Japan Plans Big Boost In Imports of Minerals

JAPANESE survey teams and business delegations are making a worldwide search for new sources of raw materials to cover long term needs of metallurgical industries.

The steel industry, for example, hopes to raise ingot output from an estimated 23.9 million tons in 1960 to 48 million tons within a few years. The industry more than doubled its output in the last three years.

With natural resources limited in Japan, increasing amounts of iron ore, coking coal, bauxite, copper concentrates, and other minerals must be imported. Many metal companies plan to exploit undeveloped deposits abroad.

• **Iron Ore**—Engineers of two leading Japanese steel mills are making a survey of a proposal to obtain about 12 million tons of iron ore from Swaziland, South Africa, over a ten year period. A third firm is negotiating for the exploitation of iron ore properties in the Queen Charlotte Islands, B. C. A mission of the Japanese steel industry plans to visit South and Central America soon to search for additional iron ore resources.

• **Coking Coal** — Eight Japanese steel producers have signed a contract to "sample" 100,000 tons of coking coal from the Kianga coal mines in Queensland, Australia. They hope to import 1 million tons a year from this source. Coal and coke are being bought from Western Canada.

• **Nonferrous Metals** — A leading Japanese smelter is stepping up the development of copper mines in the Fiji Islands. Aluminum refineries are showing interest in Australian bauxite. The nickel industry is considering a plan to develop nickel ore resources in the Celebes.

Ford Builds in England

Structural work will start in May on Ford Motor Co.'s $2.8 million blast furnace at its Dagenham (London), England, plant. The furnace will be 216 ft high and will turn out daily 750 tons of pig iron.

CF&I Project Nears End

Construction of an oxygen steelmaking facility at the Pueblo, Colo., plant of Colorado Fuel & Iron Corp., Denver, is scheduled for completion this month (STEEL, May 23, 1960, p. 115). The plant will use two processing vessels (100 tons capacity each) that will have a monthly capacity of 50,000 to 70,000 tons. One vessel will be operated at a time; the other will take over when the brick lining in its twin shows signs of wear.

Opens Bagdad, Pa., Plant

Allegheny Ludlum Steel Corp., Pittsburgh, has placed in commercial production the 1040 ft, continuous, normalizing line in its Bagdad, Pa., plant. The plant contains 160,000 sq ft of floor space and processes high grade, grain oriented, silicon electrical steel strip. It operates as a department of the company's West Leechburg (Pa.) Works. Considerable plant space and equipment at West Leechburg Works, which formerly processed silicon steel, is now available for processing stainless steel strip.

The line was built by the Electric Furnace Co., Salem, Ohio. It will normalize silicon strip from 0.010 to 0.030 in. thick and up to 34 in. wide, at speeds up to 300 fpm.

Plans Gear Research Unit

Philadelphia Gear Corp., King of Prussia (Philadelphia), Pa., is constructing a gear research building and pattern shop. Occupancy of the 60,000 sq ft building is scheduled for this summer. The new facilities will permit the company to perform isolated testing of gear trains for radar and radio telescope applications entirely removed from vibration. The company makes power transmission equipment.

Buys Coil Cutting Lines

National Can Corp., Chicago, purchased four coil cutting lines to be used for the shearing of metal for the manufacture of metal containers. The coil cutting is a departure from its past manufacturing methods. It permits National Can to use large coils of plate in place of precut sheets. One of the lines will be installed in the firm's Pacific Div., one in the Central Div., and the other two at points to be announced later. The lines will uncoil, straighten, feed and shear tin plate as thin as 0.007 in. and steel stock as thick as 0.02 in.

Fabrication Plant Opened

Kaufman Enterprises Inc. has been organized to specialize in design and fabrication of electrical transmission towers, switchyard structures, and substations. Full scale production is underway at its plant in Kaufman, Tex. The company will also offer fabrication and design services for all types of steel and aluminum structural components. Officers are: President, R. J. Van Somer; executive vice president, D. E. King; vice president, O. P. Corley; and secretary, W. M. Parks.

Buys Abrasive Line

Manhattan Rubber Div., Raybestos-Manhattan Inc., Passaic, N. J., acquired the abrasive and grinding wheel business of U. S. Rubber Co., New York.

Titanium Metals Expands

Titanium Metals Corp. of America, New York, has launched a $2 million expansion of its Toronto, Ohio, plant (STEEL, Mar. 6, p. 20). New facilities will be constructed for production of titanium tubing to meet increasing demand of nonmilitary users, primarily chemical processors. Seamless and welded-and-redrawn tubing will be produced in sizes ranging from 0.5 to 3 in. in diameter in lengths up to 30 ft. Welding, tube drawing, pickling, and vacuum annealing

equipment will utilize 55,000 sq ft of floor space. The company is a jointly owned subsidiary of Allegheny Ludlum Steel Corp., Pittsburgh, and National Lead Co., New York. TMCA produces tubing in Allegheny Ludlum facilities at Watervliet, N. Y., and Wallingford, Conn.

Heating Furnace Ordered

Tennessee Coal & Iron Div., U. S. Steel Corp., will install a gas fired, two zone, pusher type furnace for heating blooms and billets at its Fairfield, Ala., plant. The furnace will be built by Salem-Brosius Inc., Pittsburgh. It will be designed for end charge and side discharge of the work. It will have an effective hearth of 38 ft long and 8 ft wide.

New Mill Rerolls Aluminum

A site near Oswego, N. Y., has been selected for a $30 million aluminum mill. The participating companies are Aluminium Ltd., Bridgeport Brass Co., Cerro Corp., and Scovill Mfg. Co. The mill will reroll aluminum stock which the four firms will use in fabricating various products.

Burroughs Forms New Unit

Burroughs Corp., Detroit, is consolidating and expanding its operations in Canada under a new subsidiary, Burroughs Business Machines Ltd., Toronto, Ont. J. L. Rapmund is president. The Toronto plant will be enlarged 20 per cent at a cost of about $200,000. The cost figure includes new machinery.

Reactive Metals Buys Mill

Reactive Metals Inc., Niles, Ohio, has acquired a tube mill from Bridgeport Brass Co., Bridgeport, Conn., to produce tubing of zirconium, titanium, columbium, tantalum, and other exotic metals. Equipment involved in the installation includes tube reducers; draw benches; a vacuum annealer; straightening, pickling, and finishing equipment; and quality control instruments.

Reactive Metals is an integrated producer of zirconium and titanium. It is a subsidiary of National Distillers & Chemical Corp., which is merging with Bridgeport Brass.

Linde Opens Oxygen Plant

Linde Co., a division of Union Carbide Corp., New York, is producing liquid oxygen and nitrogen at its new plant at Neosho, Mo. The plant, with a daily capacity of 140 tons, will supply rocket engine development facilities at Ft. Crowder Reservation and needs of other industrial gas consumers throughout the Southwest by means of railroad tank cars and highway liquid transports.

ASSOCIATIONS

Can Manufacturers Institute, Washington, elected R. L. Perin, Continental Can Co., New York, president. Vice president is R. C. Rosecrance, J. L. Clark Mfg. Co., Rockford, Ill.

NEW OFFICES

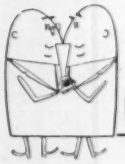
Commercial Shearing & Stamping Co., Youngstown, opened a district sales office at 10701 W. National Ave., Milwaukee, Wis. Don C. Melcher is in charge.

Robbins & Myers Inc., Springfield, Ohio, opened a branch office for its **Moyno Pump Div.** at 7755 Paramount Place, Pico Rivera, Calif. J. L. Badgley is sales engineer in charge of branch operations.

NEW PLANTS

Construction of a plant at Elizabethtown, Ky., for the production of ceramic permanent magnets is nearing completion. It is being built for **Magnatronics Inc.,** a subsidiary of **Crucible Steel Co. of America,** Pittsburgh. Joel Hunter is president of Crucible Steel.

Ohio Gear Co., Cleveland, opened a distribution center at 142 Utah Ave. S., San Francisco, Calif. The new warehousing operation is serviced by Adam Hill Co.



CONSOLIDATIONS

Jervis Corp., Grandville, Mich., acquired **Lee Silver Service Inc.,** Detroit. The companies manufacture appliance, marine, automotive, aircraft, and missile hardware and parts.

Studebaker-Packard Corp., South Bend, Ind., acquired **Chemical Compounds Inc.,** St. Joseph, Mo., processor of additives for motor oil and fuel.

NEW ADDRESSES

General Vacuum Corp. moved to a new plant at 81 Hicks Ave., Medford, Mass.

Camloc Fastener Corp., Paramus, N. J., moved the offices of its Western Div. to 5455 Wilshire Blvd., Los Angeles 36, Calif.

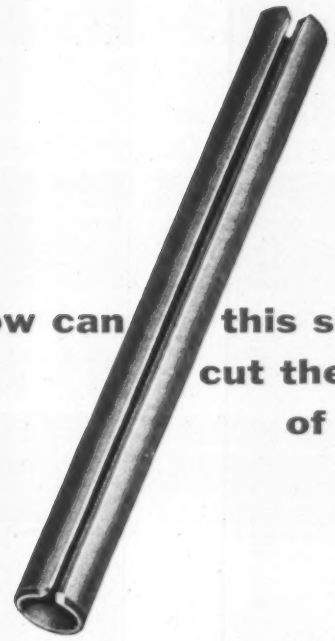
Cast - Master Dept., Hydraulic Press Mfg. Co. (a division of Koehring Co.) will move its manufacturing and administrative operations from Bedford, Ohio, to H-P-M facilities in Mt. Gilead, Ohio. The move will be completed by July 1. Cast-Master makes diecasting machines.

Parker - Hannifin Corp., Cleveland, moved the sales office for industrial components for the Southwestern region to 10567 Jefferson Blvd., Culver City, Calif. Regional manager is D. G. Henderson.

General Precision Equipment Corp. and two of its subsidiaries, **General Precision Inc.** and **National Theatre Supply Co.,** moved to new headquarters at 50 Prospect Ave., Tarrytown, N. Y. Manhattan offices are now at 220 E. 42nd St., New York 17, N. Y.

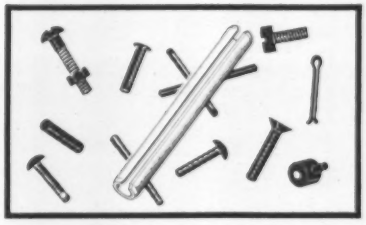
Caloric Appliance Corp. will move its executive offices Apr. 1 to Wyncote House, Washington Lane and Township Line, Wyncote, Pa. Manufacturing operations will continue at Topton, Pa.

How can this simple fastener cut the cost of your product?



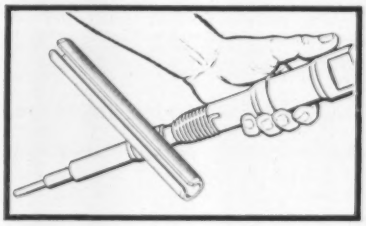
Rollpin aids standardization and reduces inventory

Rollpin readily replaces taper pins, grooved pins, straight pins and set screws; it can be used as a locating dowel, hinge pin, cotter pin, stop pin or, in some applications, even as a rivet. Thus, when you standardize on a Rollpin you can drastically reduce the variety of fasteners in your inventory—save money in purchasing, storage space and stock handling.



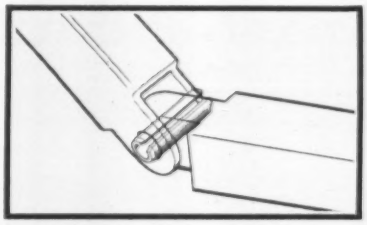
Rollpin simplifies production processing . . . saves man-hours

When you use Rollpin you can eliminate costly precision drilling, or tapping operations. And there's no need for any secondary locking operation—such as lock wiring or peening. That's because Rollpin is a slotted tubular steel spring whose chamfered ends drive easily into standard production-drilled holes, compressing as driven. The spring tension against the hole walls retains Rollpins securely against severe vibration. Independent studies have shown that installed costs of Rollpin are as much as *91% less* than those for a dowel pin or *95% less* than the installed cost of a taper pin.



Rollpin simplifies product maintenance

Only a drift pin or standard punch is required to remove a Rollpin. The slotted tubular shape and the spring action principle do not damage hole walls or enlarge the original hole diameter. Consequently the same pin is easily re-inserted and can be used again and again. Mail our coupon today for the complete Rollpin story.



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- ☐ ELASTIC STOP® nut bulletin
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GRAFTON MASSACHUSETTS · LOS ANGELES CALIFORNIA · PALO ALTO CALIFORNIA · FORT WORTH TEXAS

Technical Outlook

GAS TURBINE ENGINES— A 140 hp turbine engine is being sold by Chrysler Corp., Detroit, to vehicle makers for heavy duty trucks. Performance is said to be equivalent to or better than a standard 200 hp gasoline engine. Expected fuel consumption: 19 mpg.

NEW 600 SERIES FOR STEEL— A 600 series has been added to the American Iron & Steel Institute's numerical designations of steels. The new series has been assigned to high temperature, high strength alloys.

NICKEL HEADS FOR SPACE— An ounce of tiny nickel pellets plays an essential role in an oxygen recovery system for space vehicles. Devised by Aero-Space Div., Seattle, Boeing Airplane Co., the system converts exhaled carbon dioxide into water and methane. Water is later broken down for oxygen recovery.

MORE SENSITIVE ANALYSIS— An atomic absorption spectrometer made by Perkin Elmer Corp., Norwalk, Conn., is said to permit more accurate determinations of trace element concentrations in metals. The firm lists these sensitivities for the instrument: Calcium, zinc, cadmium, and iron, 0.1 microgram per milliliter; magnesium, 0.03.

TITANIUM SUCCESS— A solid propellent rocket encased in titanium passed a static firing test conducted by the Army Missile Command, Huntsville, Ala. Maj. Gen. John A. Barclay described the titanium case as 30 per cent lighter than those currently employed. Its corrosion resistant properties are highly desirable because storage often involves prolonged exposure in Alaska or the Canal Zone.

STUDY SUPERCONDUCTORS— Dr. Guy Suits of GE states that his firm's studies of electron tunneling between superconductors may soon lead to the development of a simple, ultrasmall device that could function as switch, diode, negative-resistance diode, triode, resistor, or condenser. The operating area need not be larger than the intersection point of the "T" in "cent" on the back of a penny.

IMPROVED NUCLEAR FUEL METHOD— A new fabricating technique employs vibration to densify uranium dioxide powder prior to sealing, forging, and swaging to final diameter. The process enables Babcock & Wilcox Co., New York, to eliminate pressing, sintering, grinding, and inspection of individual pellets. Both output and core life are increased.

INFRARED GAINS— A testing tank for missile bodies (nearly 8 ft in diameter) employs 3000 quartz infrared lamps to reproduce the high heats of re-entry. Capacity is 10,000 kilovolt-amperes for 20 seconds or 6000 for 5 minutes, says Boulder Div., Boulder, Colo., Beech Aircraft Corp.

IMPROVED DIESELS— A Detroit firm, working on an Army contract, is said to be developing a diesel engine with a variable compression ratio that will ultimately permit a 700 hp unit to do as much work as a 1000 hp conventional gasoline engine.

COMPUTERS CAN GOOF TOO— When an inordinate number of students flunked a course with averages of 22, officials at Lafayette College, Easton, Pa., took a look at its computer. It was in error. The averages were recomputed by hand.

FREE MACHINING STAINLESS— A new grade of stainless called Uniloy 303MA is said to permit machining speeds 50 per ecnt faster than AISI 303. Universal-Cyclops Steel Corp., Bridgeville, Pa., the maker, also says the new alloy permits roll threading. Principal alterations in composition: Less sulfur and an addition of 0.70 per cent aluminum.

Some of the nation's machining authorities say industry is wasting as much as $3 billion each year through machining inefficiency. The loss is attributed to the gap between what's being done in production and what could be done. Their comments on the major areas for improvement can help you know . . .

How to Avoid

Excessive cutter overhang and poor tool geometry are two of the errors in this "staged" setup at Jones & Lamson Machine Co., Springfield, Vt.

METALWORKING managers **could improve the efficiency of nearly all their machining operations 10 to 25 per cent by simply taking full advantage of machining technology.**

That's the opinion of many of the country's machining experts. They say industry is wasting a substantial share of the estimated $12 billion it spends each year for cutting chips.

E. J. Krabacher, senior research supervisor, Cincinnati Milling Machine Co., Cincinnati, outlines the problem this way: "The fact that production machining practice lags substantially behind machining technology is not surprising. What is surprising is the extent of this gap . . . and the fact that more people have not realized and taken advantage of the vast potential for savings . . . ."

To define some of the shortcomings and to suggest ways to boost efficiency, STEEL's editors turned to seven experts. This report is based on their opinions.

• You can get off to a fast start toward optimum efficiency by simply placing more emphasis on it.

Lack of incentive to improve perpetuates the problem in many shops, says K. W. Stalker, manager of engineering, Goodman Mfg. Co., Chicago. "We leave many of the variables in the hands of the operator and force him to use his experience to determine the setup. Since he controls the variables, he has little pressure to improve the job."

Mr. Stalker says that time studies don't do the trick; too often they

Common Shortcomings in Machining

simply measure the efficiency of the man under what may be obsolete setup conditions. "If you really want to improve machining efficiency, get good machining data and information to supervisors and operators. Then encourage them and give them an incentive to use the best possible machining techniques."

Where can you get the good information? For a starter, Mr. Stalker recommends talks with cutting tool manufacturers.

Michael Field, president, Metcut Research Associates Inc., Cincinnati, adds: "Management ought to encourage machine shop and production supervisors to become experts in machining technology. The major mistakes in machining can be attributed to the fact that someone was uninformed."

He says the cure is simple; contact the informed sources, including tool manufacturers, handbooks, and business literature. Then concentrate on attendance at technical meetings, and visit other experts with similar machining problems.

Most of the experts told STEEL that the starting place is with management: A decision must be made to emphasize optimum machining efficiency.

• Get supervisors and operators to know more about selecting the right speeds and feeds.

Often, the most direct way to crop metal cutting costs is to increase the metal removal rate. Too many times, cutting speeds are held down to preserve a cutting tool. The premise seems to be: Long tool life is the goal of the operation. Some jobs running between 200 and 300 sfpm ought to be in the 600 to 700 sfpm range, for example. You may have to use different tools, maybe even a more solid machine, and settle for shorter tool life to achieve the higher speeds. But measured against the returns from higher removal rates, the cost of making the changes can become insignificant.

At one of the Cleveland plants of Thompson Ramo Wooldridge Inc., the company's Tapco Group has come up with a new set of standards for feeds and speeds, based on optimum tool lives. Instead of hit-or-miss estimating ("our speeds and feeds had one thing in common—inconsistency"), each operation can be based on standard information. Result: Productivity increases of 20 to 50 per cent are common.

Removal rates may also be increased in direct proportion to an increase in feed, says Mr. Krabacher. So if you double the feed per tooth in milling, the metal removal rate also doubles. He recommends as high a feed rate as possible, commensurate with surface finish required, and with the capability of the cutting tool to withstand the severity of the cut. "Fortunately, tool life does not decrease in proportion to the increase in chip per tooth. It should be common practice when establishing cutting conditions on a production machining operation to increase the feed rate progressively until either the surface finish becomes unacceptable or until the tool fails prematurely due to heavy impact or to insufficient rigidity. With this approach, it is often possible to effect increases in productivity of 100 per cent or more."

Mr. Field suggests a simple approach to getting the right speeds and feeds:

- Pick the maximum feed that will give you satisfactory results.
- Make sure that your tool geometry is right for the job. (More on that later.)
- Use best available data to select a starting speed for the cut. See what tool life the speed gives. Measure tool life any convenient way, such as acceptable surface finish, or 0.030 in. wear land on the tool.
- Unless the life is "a mile off" from what it must be to be economical, boost the speed about 30 per cent. (In milling, you'll have to boost feed by the same amount to keep feed per tooth the same.)
- See what the tool life is at the new speed. If you get a drastic loss in tool life, drop the speed back down. But if there's no drastic loss, the new speed is probably better. (You might try another boost and watch for the same things.)

A. B. Albrecht, technical consultant, Monarch Machine Tool Co., Sidney, Ohio, says: "Increased productivity should be based on more than a reduction in manufacturing costs. It should also be based on improved quality and control. Increased cutting speeds that result in downtime changing tools, and in work spoilage haven't accomplished a thing. But we know that new equipment, properly tooled, can show time savings and cut turning costs. It has been proved on job after job."

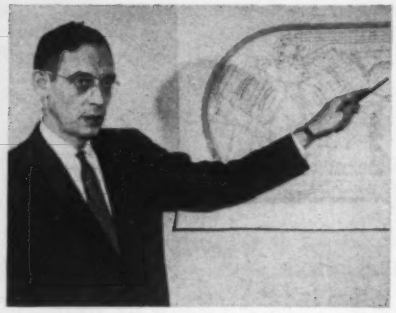
• Watch machine and setup rigidity. It can make or break an otherwise perfect setup.

Perhaps nothing can destroy a cutting tool, the workpiece (and sometimes the machine tool) as fast as lack of rigidity between the tool and the work. No matter how well you have solved all the other machining variables, this one, all by itself, can break up a tool and destroy both surface finish and size tolerances.

In addition, Mr. Field points out that other variables (particularly feed) are functions of the rigidity. That means machine

Seven Machining Experts Suggest

E. J. Krabacher, Cincinnati Milling Machine Co.: "It should be common practice to boost feed rates until the surface finish is bad or the tool fails prematurely."



K. W. Stalker, Goodman Mfg. Co.: "Management must provide production people with an incentive to improve machining efficiency. Our practice simply does not equal our knowledge."

L. P. Tarasov, Norton Co.: "The belief that grinding is used solely to get finish and accuracy may well prevent full utilization of the process."

George A. Roberts: Vanadium-Alloy Steel Co.: "Properties of tool materials have improved so much that shop experience five years old isn't good enough to go by."

Michael Field, Metcut Research Associates Inc.: "Despite the multitude of machining variables, you can get an optimum setup in a few steps."

tools must be in good repair. ("Nothing takes the place of good equipment.")

Fixtures, spindles, the workpiece, and the cutting tools all must have the beef to take the cutting forces. Consider using $1\frac{1}{2}$ in. square shanks for turning tools instead of 1 in. square shanks, for example. Be especially wary of tool overhang (a point Jones & Lamson Machine Co. specialists deliberately violated when they staged the photos on Page 96 and the cover).

Mr. Stalker ran a series of tests on the most rigid setup he could create on an engine lathe. Keeping all other variables constant, he gradually extended the cutter overhang and measured the corresponding tool life. "For each $\frac{1}{2}$ in. increment I moved the tool out, I could plot the reduction in tool life." Twist drill tests show the same life-length relationship.

• Selection of the right tool material can't be based on experience that's five years old.

"One large shop has standardized on two grades of tungsten carbide for all its machining jobs. Both grades are good for machining cast iron or the high temperature alloys, but neither is right for cutting most of the steel alloys," says Mr. Stalker. In that plant, he figures a minimum of six different carbide grades ought to be used to get optimum machining.

Robert T. Hook, chief metallurgist, Warner & Swasey Co., Cleveland, also cites the importance of picking the right tool material for the job. He mentions four major developments in materials that have a direct effect on machining economy: 1. Premium (vacuum sintered) grades of carbide that increase cutting abilities 25 to 50 per cent, depending on the workpiece material. 2. Ceramic tools that have proved their mettle on single point uninterrupted cuts, on abrasive materials (like cast iron), on materials 40 Rockwell C or higher, and on jobs where high speed finish turning can eliminate grinding. 3. Titanium carbide cutting tools (64 per cent TiC or higher) are competitive with ceramics at speeds to 1000 sfpm, with greater toughness than ceramics. 4. Super-high-speed steels (such as T-15 and M-4 grades) that offer two to six times as many pieces per grind as the standard 18-4-1 grade.

George A. Roberts, vice president-technology, Vanadium-Alloys Steel Co., Latrobe, Pa., also comments: "High speed steels are quite different from what they were ten years ago. On many of the new structural materials, carbides can't com-

Ways to Boost Efficiency

Robert T. Hook, Warner & Swasey Co.: "Clamped carbide inserts permit higher removal rates—cost about a third as much per edge as brazed tools."

A. B. Albrecht, Monarch Machine Tool Co.: "When you increase productivity, look for improvements in quality as well as lower costs."

pete with modern high speed steels. This is because high speed steels have closed the hardness and wear resistance gap between carbides and themselves."

As examples of what newer grades of HSS can do, Mr. Roberts cites these jobs in which one of his company's T-15 grades (Vasco Supreme) beat out other materials: 1. Regular HSS would not cut a steel forging (0.50 carbon) hardened to 444 to 487 Brinell. The T-15 HSS produced 225 cuts 5½ in. long per grind. 2. Form cutting on Monel, 18-4-1 HSS produced 400 parts per grind; T-15 turned out up to 3000 per grind. 3. A T-15 HSS shell mill rough and finish machines an AISI 4340 steel part in two passes. A cutter with carbide inserts was run at higher speeds, but took eight passes to do the job.

Even subtle differences in tool materials can affect the job success. Mr. Field points out that after you've picked just the right grade, it may pay to test competitive brands within that grade, particularly on the tough machining jobs.

L. P. Tarasov, research and development department, Norton Co., Worcester, Mass., says the tool selection shortcoming also applies to grinding. He lists the wheel that's too hard as one of the most common problems. "If too hard a wheel is selected (usually to increase wheel life and thus reduce wheel cost), the production rate is often lowered and total production cost goes up."

• Tool shapes ought to be re-examined in most plants.

Mr. Krabacher warns: "The selection of optimum tool geometry for a particular machining operation is not a simple matter since many factors are involved." But, he continues, one factor in geometry can bring improved productivity in almost any operation. Increasing the lead angle (it's the corner angle on a face milling cutter) lets you use much higher feed rates than conventional angles permit. The larger angle distributes the work of chip removal over a greater length of the cutting edge. The payoff: For example, for a constant milling chip thickness of 0.013 in., the feed rate with a 30 degree corner angle is 0.015 in. per tooth; with a 75 degree angle, the feed rate is 0.050 in. per tooth—three and a half times the production rate provided with the more conventional angle.

The experts also say industry has not taken sufficient advantage of throwaway tooling. Mr. Krabacher cites a plant in which "the application of disposable carbide tooling on 2000 turning operations resulted in a reduction of 50 per cent in metal cutting costs and an over-all reduction of 15 per cent in the average total cost per piece."

Throwaway inserts will benefit you at least three ways: You eliminate regrinding. You can tolerate much shorter tool life (so use higher removal rates) since tool change time is nil. Finally, as Mr. Hook points out: "Clamped on tools have permitted the introduction of harder grades of carbides, normally allergic to brazing techniques, and have eliminated sandwich and piggyback brazing."

• In some cases, it will pay to take a look at the selections of machining operations.

Two examples illustrate the need for an over-all review of production routing. Mr. Tarasov feels that an erroneous belief (that grinding is solely for removing small amounts of metal to produce accuracy and finish) restricts full utilization of the process. It has been proved, for example, that grinding will save 30 per cent over milling on all sides of a 20 x 6 x 3½ in. AISI 4130 forging. He suggests production managers become aware of the potential of "abrasive machining." (See Page 102.)

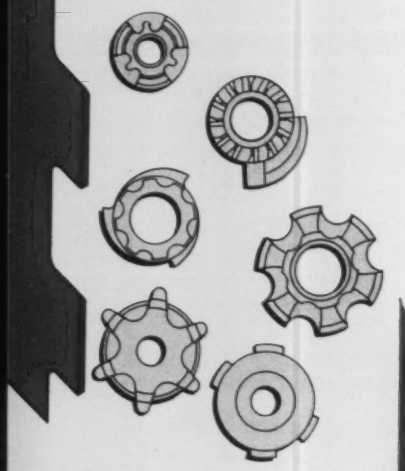
Mr. Hook cites the advantage of "slugging" in which bar stock is cut off with automatic equipment in a low overhead department, and hole drilling is done on a drill press by the operator who watches the automatic cutoff. "Data taken show that slugging a part instead of using a bar machine can show savings as high as 55 per cent over about 45 pieces."

• Chief goal should be to increase the metal removal rates.

All the steps cited by the experts are part of today's machining technology. But few of them have been adopted on a mass scale. As Mr. Stalker sees it: "The biggest single problem is that the people who know the science of machining have not reached enough people who *need* to know."

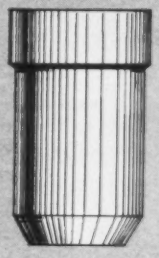
With potential savings of as much as $3 billion, industry can't afford not to close the gap, the experts feel.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

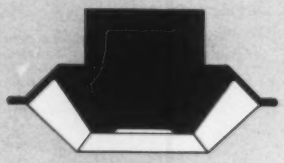


German Gear Process

From blank to finished gear in four easy steps



Sawed and trimmed blank



Rough forging

A FORGING SYSTEM developed by a German firm is turning out gears that require little or no machining for many automotive and machinery applications.

The process relies on accurate dies and is simple enough to be handled by ordinary mechanical presses. Cost savings vary from 10 per cent on prepressed parts to nearly 32 per cent on gears made entirely by hot pressing, claims Bayerisches Leichtmetallwerk, Munich.

Other advantages: 1. Gears do not have to be symmetrical. (Elliptical shapes are as easy to form as round ones.) 2. The process will form comparatively thin walls even close to an outer diameter. 3. Tooth corrections that aren't economical in mass production can be done in the pressing operation. (Examples: Amount of crown of the teeth, in height and width; smoothing out at base, profile returns.) 4. On pitch diameter measurements, qualities of 1 to 2 (AGMA standard) are reached without any finishing operations. 5. As a preforming process, machining accuracies can be considerably improved and processing time reduced. 6. Fatigue and tooth strength are improved.

For maximum economy, experience indicates that production runs must be in excess of 500 pieces.

• All case hardened and heat treatable steels normally employed in heavy duty gear manufacture can be forged by the hot pressing process.

The firm says it has recorded data for a wide variety of carbon and alloy steels, including 15 Cr Ni 6 and 20 Mn Cr 5. The process also works with high alloy tool steels.

• The tooth breaking strength of a hot pressed gear is said to be more than 25 per cent greater than a gear machined from a solid piece. Impact strength (shock loads) varies from 64 to 158 per cent.

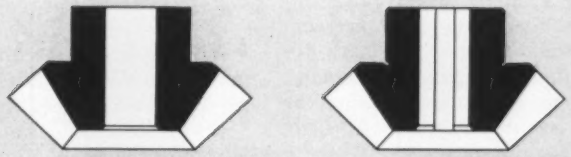
Here is how the process works: First, a blank is cut from a rod, so that the grain flow in the finished piece will run parallel to the axis of the gear. After sawing, the blank is machined to a preshape, then heated, rough forged, finish forged, and trimmed to remove flash. (Blanks must have a clean surface—heating is best in a protective atmosphere.)

The mounting hole for the shaft is located from the pitch diameter of the teeth. A simple punching blanks the hole for a shaft mounting. Shaving, broaching, or reaming can be used to finish the diameter if required.

Forging dies must be accurate—especially the female dies which shape the gear teeth. The dies are made with masters and a mechanical-chemical copying process.

Part of the secret is to pay close attention to getting the proper flow of plastic steel into the die recesses. Sufficient pressure must be generated to insure complete filling. If necessary, the toruses (doughnut shapes) in the upper and lower parts of the dies can be pressed into the gear in a kind of two-stage die arrangement. Such provisions will

Often Bypasses Machining Step



Blank from rod is struck once or twice in grain direction. Obtaining proper flow is important; entire die matrix must be filled. Only a flash trim is required before use

boost the flow of metal to insure gear accuracy.

• The process is said to be most economical when no finish machining is required. However, some economy (as much as 10 per cent) can still be realized if the method is used to make preforms.

A dash of imagination can boost benefits. Unsymmetrical parts (deviations from a circle, for example) which always increase the cost of machined pieces do not affect the difficulty of hot pressing. Only the cost of making the forging die is increased. An uneconomical tooth characteristic for mass production cutting can be made via the hot pressing method; for instance, corrections in the amount of crown of the teeth, height and width of the base, or smoothing out the profile returns are easily formed.

In the earliest gear pressing examples, the firm notes that hot pressed gears reached qualities of 1 to 2 without any subsequent finishing of the teeth. Later innovations improved the quality to grades between 1 and 3—the sort of quality suitable for agricultural machinery, elevating and load carrying equipment. (Grade 4 gears are satisfactory for some machine construction.)

• Accurate surfaces can be obtained only after making a series of tests to determine the slight alterations in tooth size and shape needed to compensate for shrinking and warping.

For example, a master and its die (rated with test instruments) produces a hot test gear that corresponds to Grade 1.

The firm discovered that the pressure angle of hot pressed teeth was always a little larger than that of a master. Some teeth had bases that were too thick, caused by reduced shrinkage of the base in comparison with the crown. To obtain a satisfactory relationship, the masters in several cases had to have the pressure angle reduced by a few angle minutes.

Another precaution: Make certain that the dies do not wear too much; otherwise errors are introduced. The company says that its experience shows that the limit is around 4000 pieces.

• The German firm emphasizes that a hot pressed gear is not necessarily cheaper than its machined counterpart.

This principle is cited: The greater the proportion of tooth to total cost, the greater is the economy.

To sum up, these prerequisites must be followed: 1. Hot pressed gears have definite tolerance limitations which predetermine their application. 2. To prevent fouling, special precautions must be taken to prevent oxide formation on gear blanks. 3. Tools must not be used beyond a predetermined degree of wear. 4. Tests are necessary to determine the strength advantages of finished forged teeth.

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Grinders Planned for Heavy Stock Removal

IN THE NEXT few years, more and more grinding experts will be casting covetous eyes at the heavy stock removal jobs in your machine shop.

On some of those jobs, they'll be talking in terms of dollar savings and faster production.

Behind their approach you'll find one of the most significant trends in machine tool applications today —the concept of "abrasive machining."

• Norton Co. already has initiated an intensive project on abrasive machining.

Ralph F. Gow, president of the Worcester, Mass., firm, in announcing his company's program, said: "For years, it has been common machine shop practice to remove stock by metal type cutting tools and use grinding wheels, if necessary, to produce the final dimensions and surface finish. Modern developments in both grinding wheels and the machinery on which they are employed indicates that this is an excellent time to thoroughly examine abrasive machining as an economical method of reducing present high costs of manufacturing."

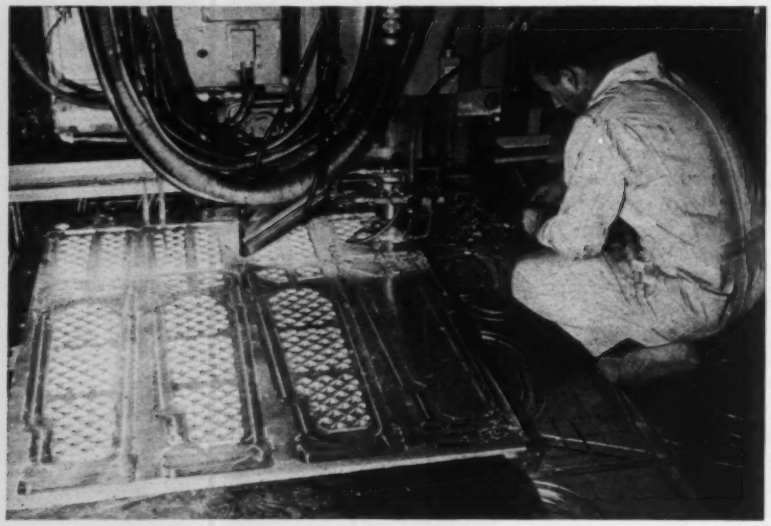
Initial Norton findings indicate that the greatest potential savings from abrasive machining may be in the fields of flat surface grinding and in slotting and grooving because of the suitability of present equipment. But the company feels that with further developments in abrasive machinery, the savings will be extended to cylindrical machining.

• Visitors to the machine tool exposition in Chicago last year got a glimpse of what's coming.

In the booth of Mattison Machine Works, Rockford, Ill., a large, high powered rotary table surface grinder went through its paces on jobs that would normally be done with a cutting tool—and the grinder showed productivity advantages of about 200 per cent.

STEEL (Jan. 2, p. 197) carried an explanation from Alan C. Mattison, president. He said: "Stock-removal surface grinding is moving ahead fast as a result of increased understanding by industry of its inherent economic advantages. Limited connotations of the process (traditionally associated with extreme accuracy or fine finish) are under evaluation by engineers who are looking for much more than paper clip savings."

Just two years ago (STEEL, Apr. 13, 1959, p. 122), the engineers at Sheffield Corp., Dayton, Ohio, announced that they had succeeded in making practical the plunge grinding of multigrooved rod mill rolls from the solid, completely eliminating traditional cutter contouring. Steel industry spokesmen figured the technique could knock as much as 75 per cent off their roll machining times. They also figured the grinding would give added roll life since the roll surface could be harder than those which must be machined with cutting tools—60 Rockwell C, for example. At least two steel companies have bought the grinders.

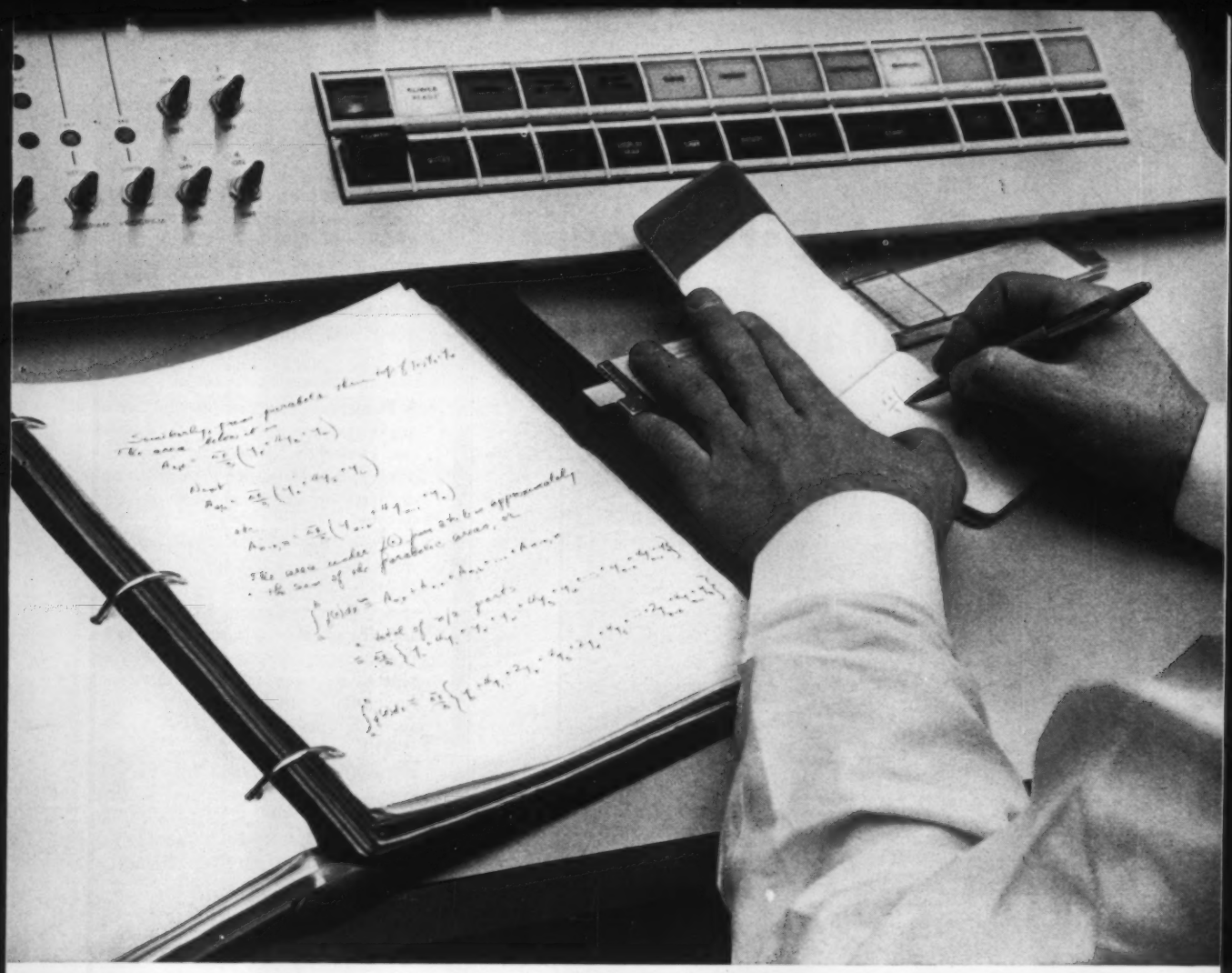


Numerical Control Retrieves a Job

Numerical control is responsible for retrieving at least one job from cutter type machining. After several years, they're again machine milling waffle patterns in missile skin at Boeing Airplane Co., Seattle.

Costs made milling on a manually operated machine prohibitive. So production men masked the sheets of Dow thoriated magnesium and chemically milled them—a standard aircraft technique.

Now, the parts are machined on a dual cutter Kearney & Trecker mill. Each setup allows 16 parts to be in position for contouring. Boeing estimates its savings at $283 a missile.



Free engineers for creative assignments with the new low-cost IBM 1620

The IBM 1620 Data Processing System is a low-cost solution to the problem of freeing engineers for their most creative and profitable assignments. Here's why:

EASY TO USE—Just a two-day training class is all you need to put your 1620 into operation. This means no delays in learning to use the 1620 computer.

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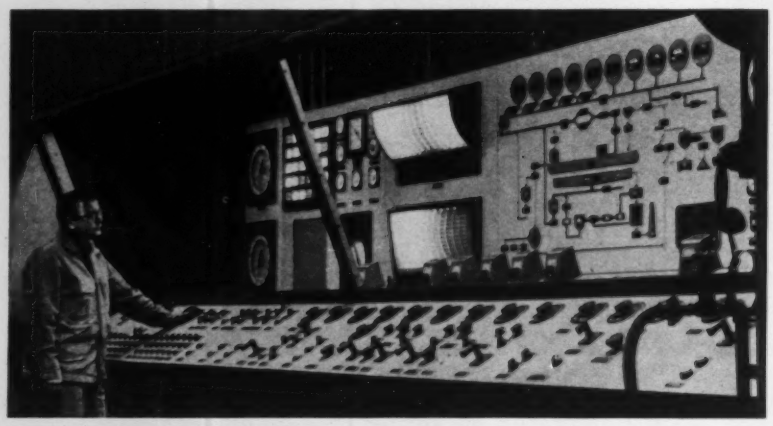
IBM
DATA PROCESSING

Sinter Plant Data Logger Tightens Analysis Control

Information recorded by computer system . . .



. . . shows needed changes in control settings

APPLICATION of high speed analysis and data recording techniques puts any process a few steps closer to automation. And it usually improves the product.

Such a system will be in operation soon in a sinter plant at Youngstown Sheet & Tube Co.'s Indiana Harbor Works, East Chicago, Ind.

Closer control of sinter quality, more predictable blast furnace performance, and possible improvements in iron analysis are some of the benefits it may provide.

A digital computer will log sinter process data, including instantaneous x-ray analysis of raw materials and the final product. The computer was supplied by General Electric Co., Apparatus Sales Div., Schenectady, N. Y. Analysis equipment was built by General Electric's X-Ray Dept., Milwaukee.

• Present operations at the plant are based on the proportioning of raw materials by weight. The company hopes eventually to base operations on chemical analyses and weights.

Knowledge of the percentages of iron, aluminum, silicon, sulfur, and calcium in the sinter will make for closer chemical control of the blast furnace product. It may also make possible a completely self-fluxing sinter, so that no limestone will have to be included in the blast furnace charge.

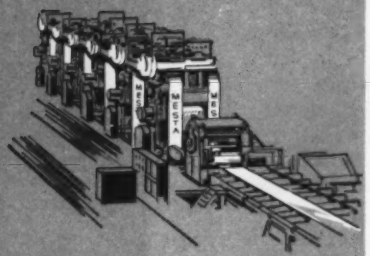
The sinter mix (not including returns) usually contains 80 per cent raw ore, 13 per cent flue dust, and 7 per cent limestone. The sinter machine operator can change control settings on the main panel to compensate for changes in the percentage of iron (or other elements) in any of the raw materials.

Cycle time for the sintering setup at Indiana Harbor—the time required for a raw material change to be reflected in the final product—is slightly more than an hour and a half.

• Chemical analyses of raw materials and sintered products are made by on-line x-ray gages.

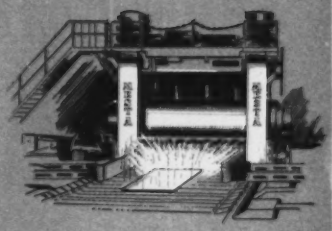
Raw ore is analyzed for iron, sulfur, and silicon. Lime and flue dust are scanned for silicon, aluminum, and calcium. Coke is checked for silicon, aluminum, and sulfur. Iron, silicon, aluminum, calcium, and sulfur content of the sintered product are also provided by on-line x-ray.

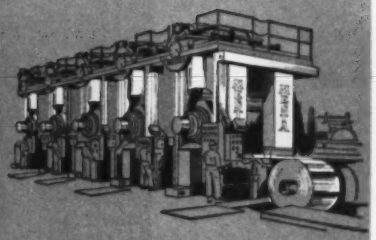
How analyses are made: A small portion of the material to be analyzed is diverted from the main stream, or conveyor. The material must be fine—90 per cent passable through a 200 mesh screen when dry. And it should contain no more than 1 per cent moisture (by weight) for satisfactory measure-

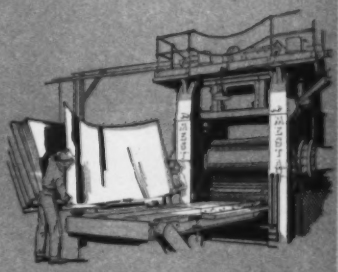


MESTA ROLLS

for Quality and Tonnage....

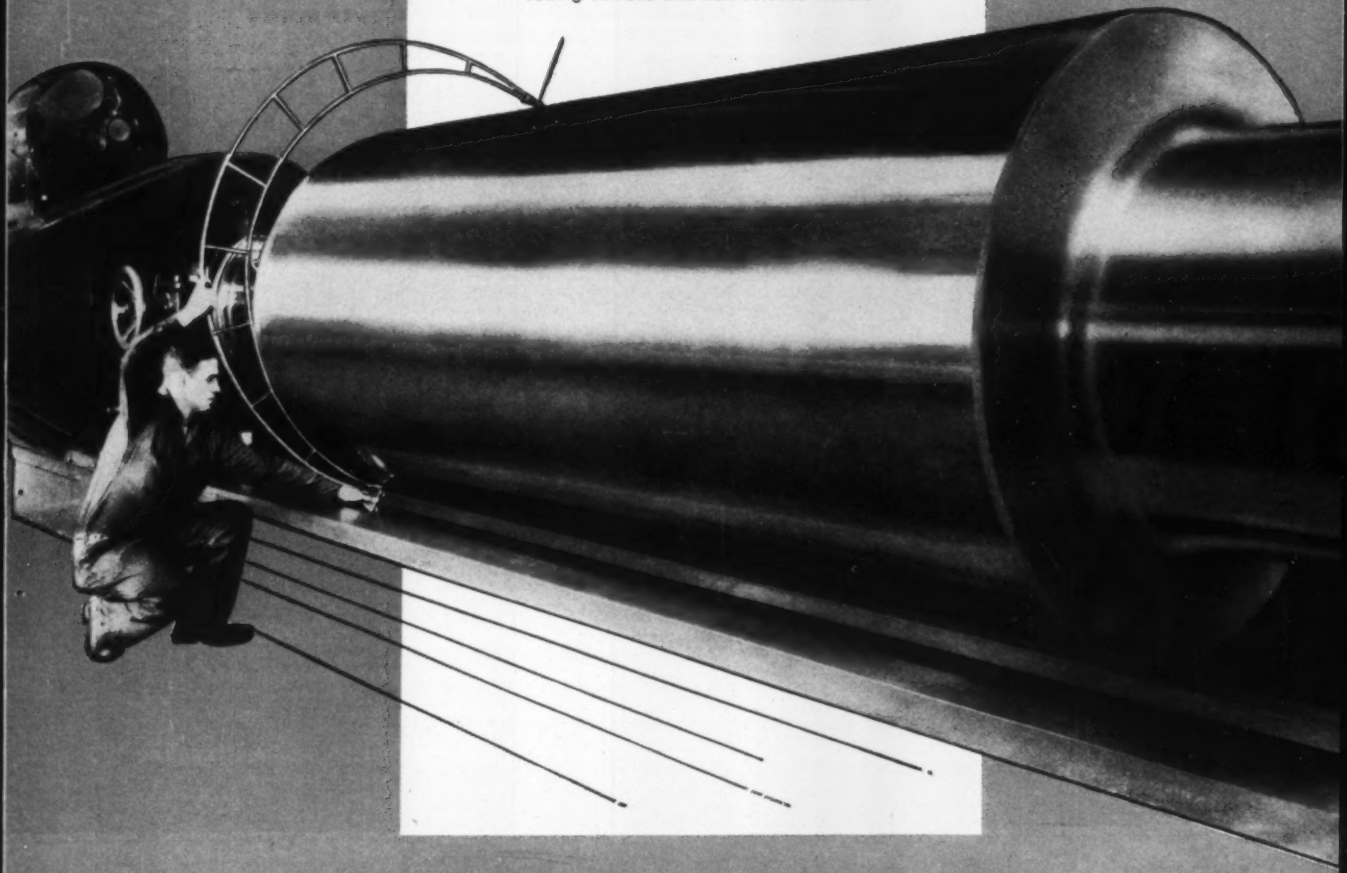






MESTA HEAT TREATED SPECIAL ALLOY CAST STEEL BACKING-UP ROLLS

for Hot Strip Mills, Plate Mills,
Tandem Cold Mills and Temper Mills
rolling ferrous and non-ferrous metals



Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

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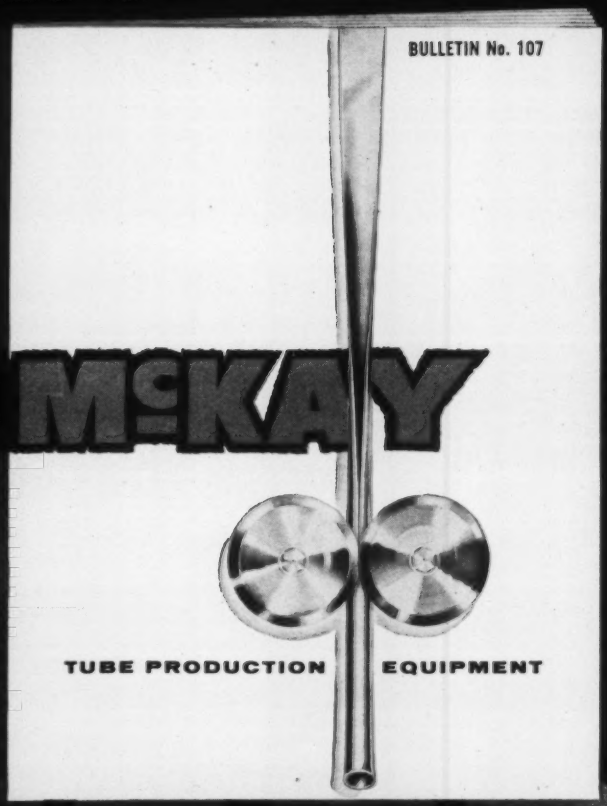
TO GET THE

LAST WORD

IN TUBE PRODUCTION EQUIPMENT...



For tube and pipe makers who are feeling the profit squeeze here are forty pages of the latest in high volume, low operating cost production equipment. From steel handling to finished product packaging, this equipment is engineered to minimize tube and pipe production costs — by America's foremost designer and builder of packaged metal forming and fabricating lines. To reserve your copy, write direct or clip and mail the handy coupon below.

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ment. A stream of the material flows past the x-ray head at a rate of 5 cu in. per minute.

The material fluoresces, or emits x-rays when it is struck by strong emissions from the x-ray head. Intensity of the rays for a certain wave length—representing a certain element—varies with the amount of that element present in the sample stream. The x-ray head includes a sensing channel for each wave length (or element) to be monitored. Circuitry used with the heads is calibrated to translate the pulse output of each channel directly into the percentage of a particular element present.

After scanning, the sample stream is fed back onto the main conveyor.

• Information from the sintering operation is fed into the digital computer for processing and printout.

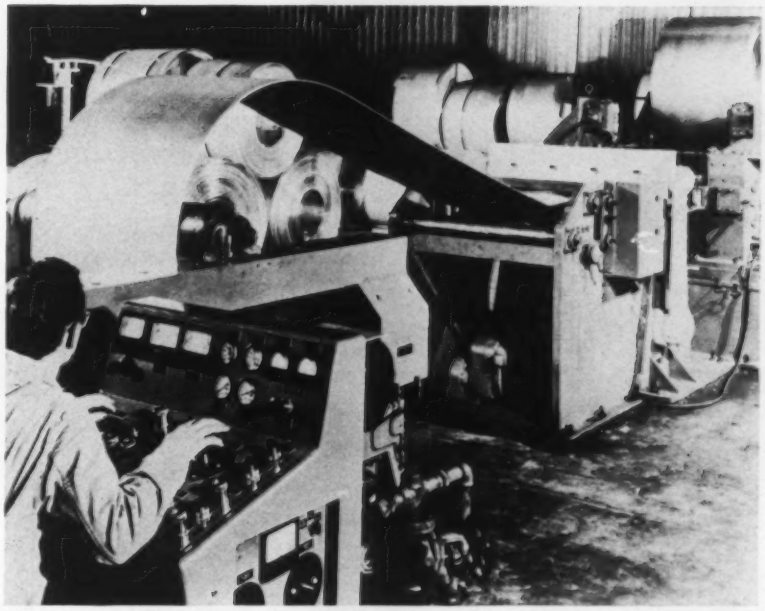
The data logging system, which can handle 62 inputs and produce 89 printouts, accepts information on the flow and analysis of raw materials. It monitors sinter mix makeup, noting speeds of the material feeders. It receives sintering machine data, such as windbox temperatures and exhaust system drafts. It also accepts information on flow and analysis of the final product.

The computer calculates percentages of fines in the raw materials, and the percentage of each material in the mix. It also calculates sintering efficiency and final yield of the sintering system.

Input information and calculated data are printed out on a chart record at intervals selected by the sinter machine operator. Possible printout intervals: 5, 15, 30, and 60 minutes.

By application of upper and lower limits to a particular printout channel, the computer can be made to indicate the reading for that channel, in red, every 5 minutes during operations when control corrections are necessary.

The computer data presentation cabinet contains equipment to record information on tape, for storage. It also contains a tape reading device that can feed taped information back into the computer for conventional printout.



Continuous strand emerges from casting rolls . . .

Aluminum Sheet Fabricator Starts with Molten Metal

CONTINUOUS CASTING facilities and sheet rolling machinery are making it possible for an aluminum fabricator to reduce material costs, speed up production, and offer a broader product line. The equipment is part of an expansion program completed recently at Consolidated General Products Inc., Houston.

The company, which produces aluminum siding, roofing, awnings, and other products for industrial and domestic use, obtained casting, rolling, and annealing equipment from Hunter Engineering Co., Riverside, Calif.

• Two continuous casting lines process molten metal from one furnace.

One operator controls flow of the molten aluminum from the furnace and through the casting rolls, where it becomes a continuous strip. Then each strand, 32 in. wide by 1/4 in. thick, loops downward into a leveler and edge miller. The material is wound into 4000 lb coils for the cold mills.

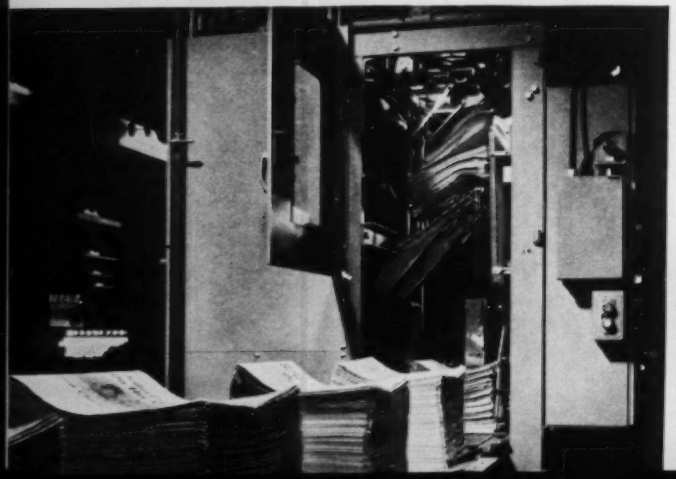
The gas fired, reverberatory furnace contains about 40,000 lb of molten alloy. A furnace temperature of about 1300° F is maintained with electronic controls. Hourly analysis with a direct reading spectrometer reveals the percentage of each component in the melt and in each coil produced.

• Final processing is provided by rolling, annealing, and coating equipment.

Gage of the cast coils is reduced from 1/4 in. to about 0.050 in., in a four high, single stand mill. After the first pass, the aluminum is annealed in a large furnace that can take several coils at a time. Then the strip is reduced to the right gage and temper for final processing. Presses and roll forming machines convert coils into end products.

The company has facilities for roll coating and baking an enamel finish on strip up to 18 in. wide.

No more hand stacking. This newspaper counter-stacker counts and stacks newspapers automatically—and can be programmed to automatically vary the stacks to meet route schedules.



No more dry pumping. Cutler-Hammer's new development—an automatic pump off control for stripper oil wells—stops the pump when oil has been lifted. Saves the pump, ups production.

CONTROL

What's new in control for automation?

A blast furnace that charges itself

More efficient automation because the Cutler-Hammer control systems man was called in at the start of planning. The art of charging a blast furnace is now a science.

Cutler-Hammer control engineers, with the furnace builders, worked three years to put all charging control functions into one integrated system. Now, the proper material in the proper amounts, all in a proper sequence are delivered to the furnace bell—automatically.

Every step of the operation can be checked visually on master control panels. Nothing is left to chance. The added cost of this kind of charging control is relatively insignificant. Complete flexibility in selection of furnace charging programs now makes possible optimum blast furnace performance.

Why you should call in the electrical control man early. Cutler-Hammer has been increasing productivity and lowering costs for many different companies in many different industries for years. This is a major reason why Cutler-Hammer should be called when you *start your automation planning.*

The company on the move. There's a new vitality at Cutler-Hammer—a new desire to solve problems. We've planned for the gigantic expected growth of the sixties and now we're ready—with new plants, new engineering talent, new and better products. We'd like to tell you about ourselves if you're planning ahead. Contact the Cutler-Hammer sales office nearest you.

Automation is more efficient when the control expert is called in early.

WHAT'S NEW? ASK...

CUTLER-HAMMER

CONTROL

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

Simplified fabrication outweighs price per pound when . . .

Switch to Stainless Cuts Coupling Cost

FABRICATORS are finding that specialty steels have more to offer than high strength and corrosion resistance. The materials are being chosen over lower priced steels in many cases because they require fewer steps in machining or other manufacturing operations.

Example: Material, labor, and overhead costs were cut 52 per cent when SAE 4140 alloy steel was replaced by Armco 17-4 PH stainless in a high pressure, hydraulic coupling body housing, manufactured by Snap-Tite Inc., Union City, Pa.

• Product cost was reduced by simplifying machine work and by eliminating some heat treating operations.

The stainless is machined as-purchased—no preliminary heat treating is needed. One turret lathe setup is required to turn and form the part. Another operation is required for threading and facing. Those four operations and raw material represent about 35.8 per cent of original part cost (based on the use of low alloy steel). A cutting speed of about 85 ft a minute and a tool feed of 0.005 in. can be maintained with the stainless vs. a speed of 60 ft a minute and a feed of 0.003 when the low alloy material was used.

The housing, which must be able to handle liquids at 4000 psi, is $1\frac{7}{8}$ in. in diameter and $1\frac{5}{8}$ in. long. It has a number of complicated contours and cuts; thin wall sections had caused some machining problems and distortion.

Previously, the company purchased normalized, SAE 4140 steel. Parts were roughed from the bar stock, heated to 1600° F for 2 hours, oil quenched, and tempered at 900° F. The four operations and expenditures for raw materials represented 10.2 per cent of part cost. After heat treatment, the material (with a hardness of 38 to 42 Rockwell C) was turned and formed into rough blanks, requiring two turret lathe setups. Those machining operations accounted for 63.6 per cent of part cost; threading and facing, on an engine lathe, added another 6.1 per cent.

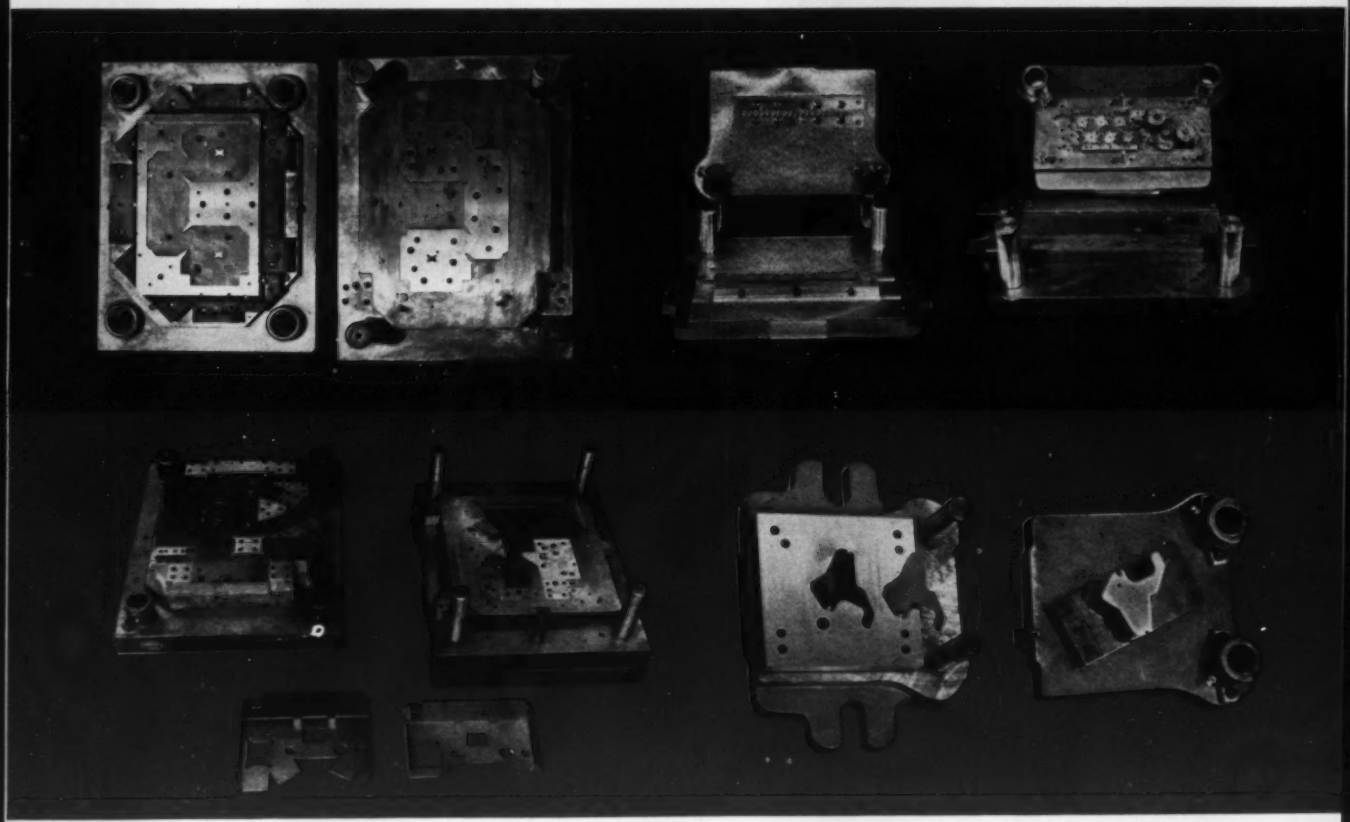
• Savings are also credited to less costly finishing operations and a smaller percentage of rejects.

Milling, drilling, and deburring require three operations on housings made of either material. But those steps were more expensive on the low alloy steel parts—15.1 per cent of total cost vs. about 11.7 per cent for the stainless.

Cost for plating the parts made of SAE 4140 stock (about 0.06 per cent of total) wasn't much more than the expenditure for cleaning, heating at 900° F for an hour, and chemical cleaning, when the stainless steel was adopted. But rejects accounted for about 4.94 per cent of total cost vs. 0.46 per cent in the stainless housings.

when you specify

DIE STEELS FOR COLD WORK



PICK THESE FOR PRODUCTION

COLONIAL NO. 6

First in the tool room for general-purpose versatility! Easy to machine; minimum size change in hardening; won't crack even in intricate shapes. Oil hardening, heat treats from low temperature.*

AIR HARD

The stay-put steel for dies, punch plates, fixtures that can't be ground to fit – no warping, no shrinking, no trouble. Deep air hardening; high strength; good wear resistance.*

OHIO DIE

High carbon, high chromium, air or oil hardening. Exceptionally tough at high hardness, this popular steel provides outstanding wear resistance with corresponding long die life in service.*

CROCAR

Top wear resistance with very high carbon content—and probably the least movement in hardening of any die steel. Balanced composition for easy machining. Air or oil hardening.

These grades are also available Precision Ground in flats or squares—ready for immediate production use. Satin smooth finish. Square, sharp corners. Protective wrapping. The sizes you want (in the hundreds!)

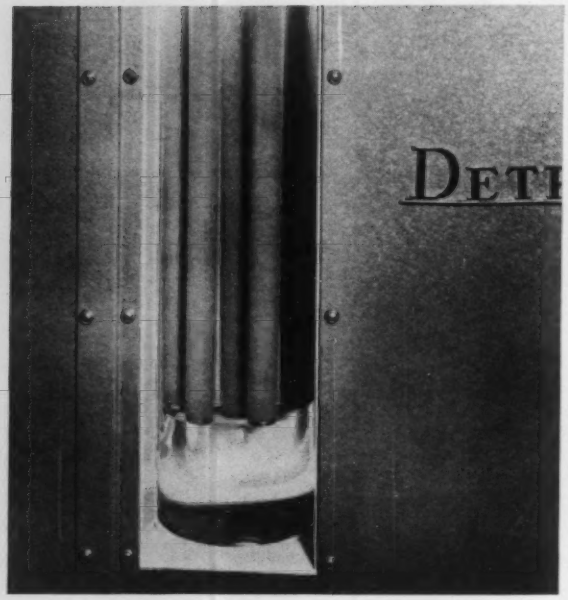
FIRST QUALITY · TOOL & SPECIAL STEELS · V/A

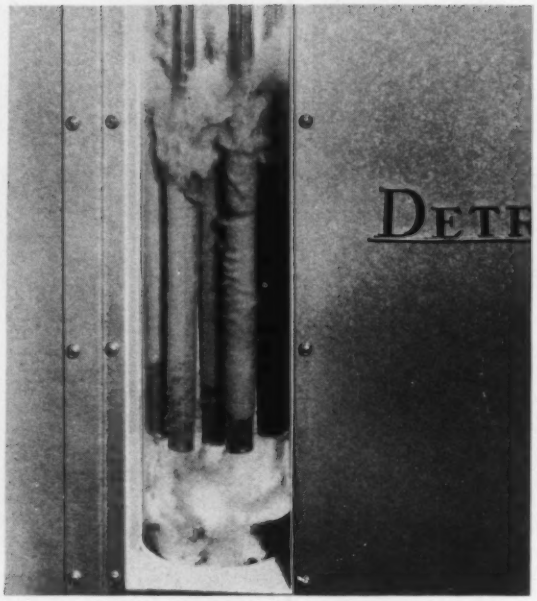
VANADIUM-ALLOYS STEEL COMPANY

GENERAL OFFICES: LATROBE, PA.

DIVISIONS: Anchor Drawn Steel Co. • Colonial Steel Co. • Metal Forming Corporation • Pittsburgh Tool Steel Wire Co. • Vanadium-Alloys Steel Co.

SUBSIDIARIES: Vanadium-Alloys Steel Canada Limited • Vanadium-Alloys Steel Societa Italiana Per Azioni • EUROPEAN ASSOCIATES: Societe Commentryenne Des Aciers Fins Vanadium-Alloys (France) • Nazionale Cogne Societa Italiana (Italy)





Dirt charged filter aid drops from stainless filter cell. It's part

Automatic Machine Cleans Degreaser

SOLVENT CLEANING efficiency is upgraded by a new automatic filtration system. It reduces or eliminates the need for cleaning out the main degreaser section to remove solids, such as polishing compounds, and provides a continuous supply of filtered solvent for spray or liquid rinsing.

Diatomaceous earth (called a filter aid) on a stainless steel, cartridge type unit clarifies the solvent. The filter cells are automatically cleaned and recoated; the time between cleaning cycles is controlled by the equipment and depends on the buildup of solids. Additional filter aid is added during the cleaning cycle, and the filter cells are cleaned and recoated without operator attention. An incorporated centrifuge recovers solvent from the spent filter aid.

Detrex Chemical Industries Inc., Detroit, makes the unit.

• Diatomaceous earth on stainless steel filter tubes clarifies the solvent.

Filtration is done inside a glass tube so that the action of the unit is visible. Stainless steel elements support the layer of diatomaceous earth which is used to filter the solvent. Proper choice of the filter aid material depends on the type of solvent to be cleaned.

The diatomaceous earth is stored in a hopper which is part of the unit. It holds 25 quarts, enough for about as many cycles of the equipment. The level of the powder in the hopper is checked each day. While the equipment is being operated, filter aid is added to the solvent.

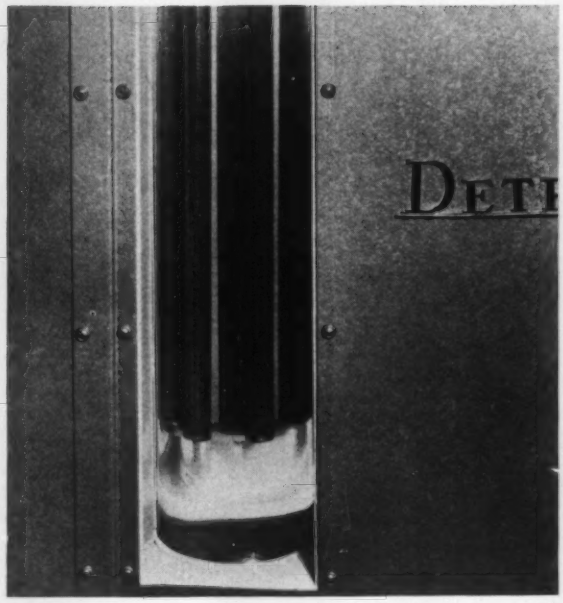
At startup, the unit dispenses enough filter aid to precoat the filter cells. As the precoat is being built up, solvent recycles to the receiver tank. That prevents any diatomaceous earth from entering the cleaning system served by the filter unit.

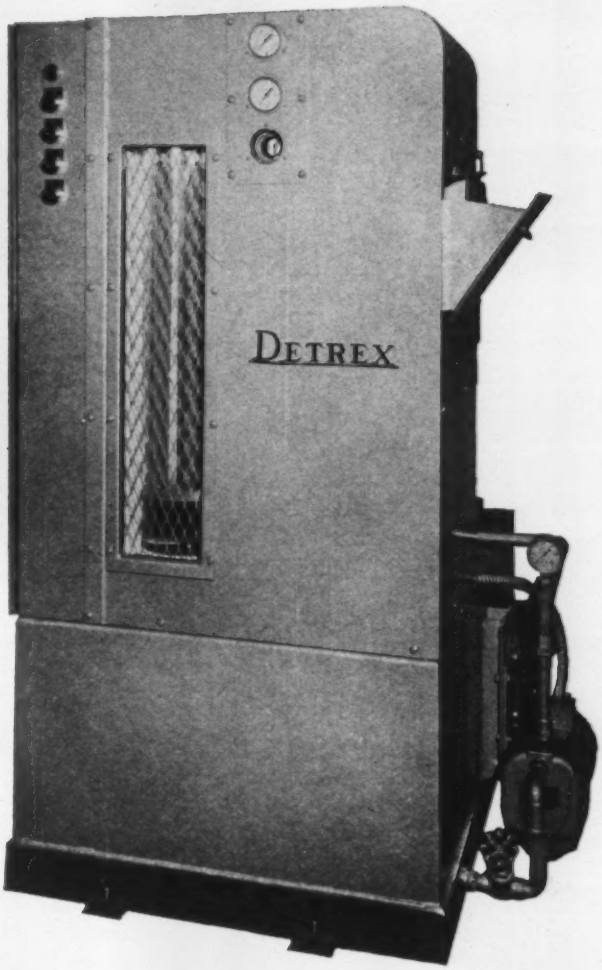
The recycle is continued until the solvent is clear; then motorized valves are actuated to direct the cleaned solvent to the degreaser unit.

• The automatic cleaning cycle is controlled by the buildup of solids.

As the cleaning process continues, the filter aid and the contained solids form a thicker coating on the stainless steel filter elements. This creates a resistance to flow and builds up the back pressure of the solvent. A pressure switch is incorporated into the machine. At the start of the cycle, the back pressure will be about 20 psig. When the back pressure reaches about 30 psig, the switch operates and starts the cleaning and recoating cycle.

For cleaning the filter, the flow of solvent is reversed by changing the position of the control valves. That frees the filter aid, which is carried by the solvent into a centrifuge contained in the unit. By changing the valve positions again, fresh filtering powder is carried to the tubes, and they are recoated; the procedure is the same as in the initial steps. When recoating is completed, the unit is returned to the line. In some cases, the soil in the solvent is not enough to cause actuation of the cycle during the work-





of cycle in which . . .

Solvent

ing day; in that case, restarting of the unit will cause a fresh coating of the filter aid to be applied.

Total time required for the cleaning cycle, during which the solvent is diverted from the degreasing system, is about 4 minutes.

• A centrifuge collects the spent filtering material and the solids it has removed; contained solvent is returned to the system.

To avoid waste of solvent with the spent filter aid, the discharge from the filter cleaning step is fed to the basket of the unit's centrifuge. A cloth bag lines the perforated basket. The cycle for the centrifuge is about 25 minutes. The clean solvent draining from the centrifuge is returned to the receiving tank and passes through the filter before going to the degreaser. The centrifuge basket will hold the solids from about 25 cleaning cycles before it is opened to remove the dried cake.

The centrifuge operates without shutting down the regular filtration cycle.

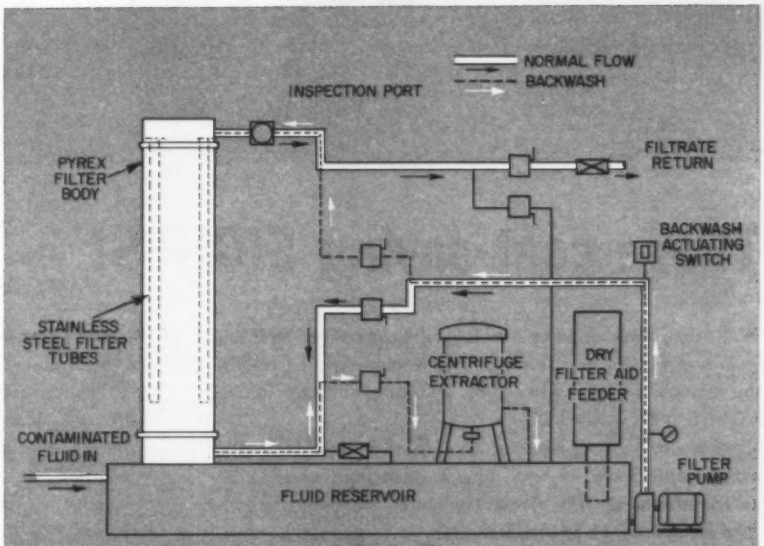
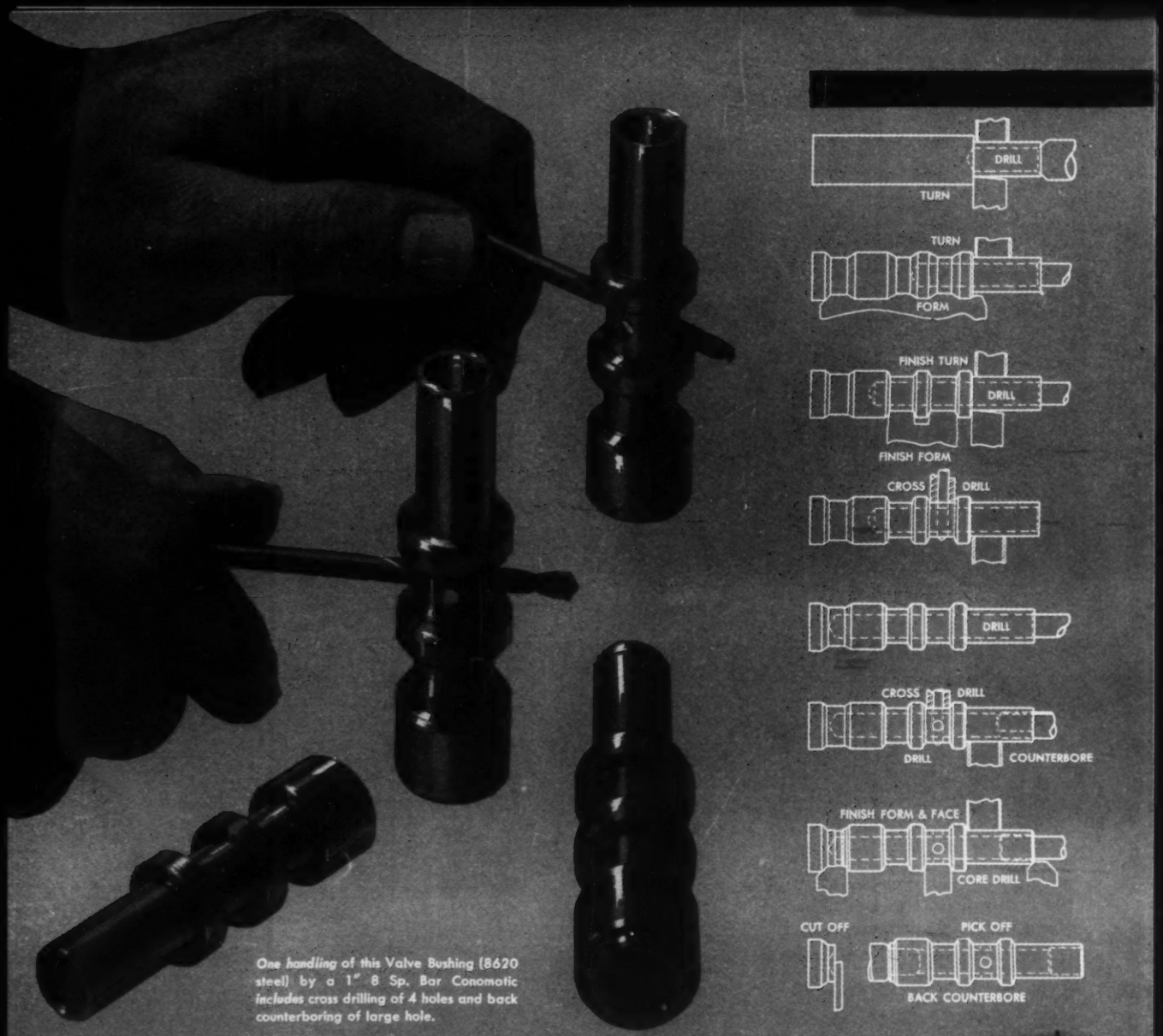
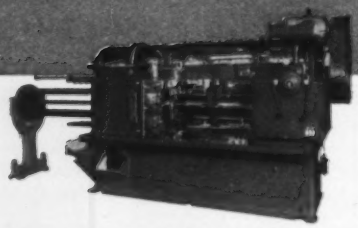


Diagram shows cleaning and run cycles for solvent cleaning machine. Bypass to sump during precoating is also automatic



One handling of this Valve Bushing (8620 steel) by a 1" 8 Sp. Bar Conomatic *includes* cross drilling of 4 holes and back counterboring of large hole.



Those cost-saving EIGHTS!

With more work spindles and tooling positions for including — in one chucking — operations that would otherwise require the expense of second handling, you just can't *beat* THOSE COST-SAVING EIGHTS.

Likewise, as replacements of four spindle machines — on more simple work — with double stock feed and double setup, producing two pieces per cycle, nothing *compares* with THOSE COST-SAVING EIGHTS.

For ever-increasing work requirements — in less floor space, with less power, less coolant, less lubricant and maintenance, and less transfer and paper work — many "automatic" users are finding THOSE COST-SAVING EIGHTS more *profitable*. How about *you*?

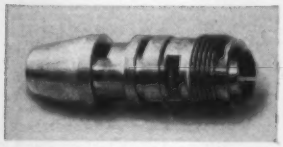
Write, wire, or phone *today* for particulars. There is no obligation. Cone Automatic Machine Company, Inc., P.O. Box 27, Windsor, Vermont.

Conomatic

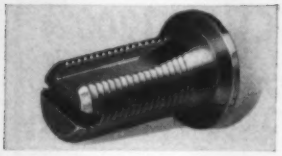
World's Most Productive Line of Automatic Lathes

Consistent, *dependable* handling of one or more of the following operations in a single setup has earned the CONOMATIC an enviable reputation as the *leader* of THOSE COST-SAVING EIGHTS: cross drilling and milling, end milling, broaching, spinning, stamping, OD and ID burnishing, eccentric drilling, turning and boring, eccentric forming, multiple hole drilling and tapping, oil groove rolling, back facing, back slotting, back hole drilling and counterboring, induction hardening and quenching.

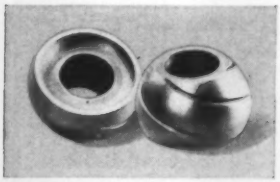
One handling of this Ball Joint Housing (1012 steel) by a 2⅝" 8 Sp. Bar Conomatic *includes* burnishing inner ball race.



One handling of this Sleeve (B-1112 steel) on a 1⅛" 8 Sp. Bar Conomatic *includes* offset milling.



One handling of this Threaded Stud on a 1" 8 Sp. Bar Conomatic *includes* cross milling, slotting, thread chasing, and back facing (all operations without stopping the work spindles).

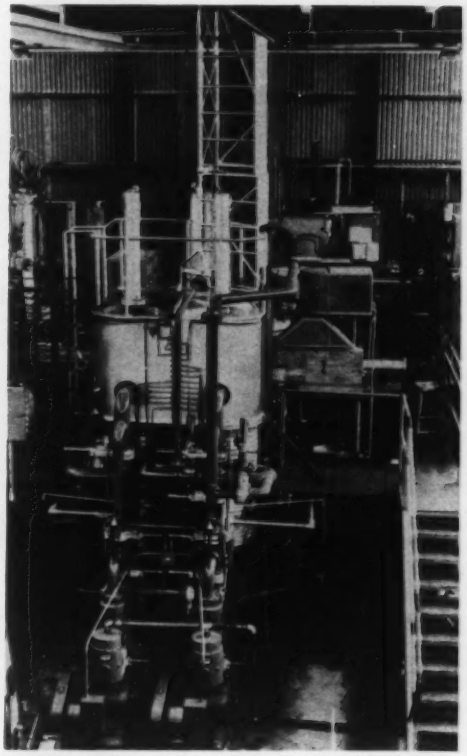


One handling of this Ball Joint (8620 steel) by a 2⅝" 8 Sp. Bar Conomatic *includes* the forming of the oil groove and deburring of the groove.

One handling of this 10¾" long Valve Stem (Monel Metal) by a 1⅝" 8 Sp. Bar Conomatic *includes* lead screw cutting of L. H. Acme Class III thread and burnishing of unthreaded section.

Electron Unit Slims Refractory Metal Gap

Furnace can turn out about 30,000 lb month



AN ELECTRON beam furnace with a capacity of about 30,000 lb a month is going into operation at Stauffer Metals Div., Stauffer Chemical Co., Richmond, Calif. The company estimates addition of that amount will raise total U. S. capacity for the production of electron beam refined refractory metals to more than 200 tons annually.

Mounting interest in electron beam technology and demand for refractory metals has caused Stauffer to place added emphasis on advanced research and engineering programs.

"We anticipate substantial increases in sales—possibly as high as threefold—during 1961," reports Dr. Donald F. Mastick, general manager of the division.

"We also expect to do more custom smelting for other metal producers and to increase sales of our electron beam furnaces."

Refractory metals are getting a bigger play from missiles, jet aircraft, nuclear equipment, and other applications requiring high strength at elevated temperatures.

• The furnace, rated at 300 kw, is capable of refining and casting ingots of refractory metals up to 8 in. in diameter and 42 in. long.

For most current fabricating techniques, that is regarded as the optimum size, says Stauffer. It makes handling easy and flexible and provides low cost operation.

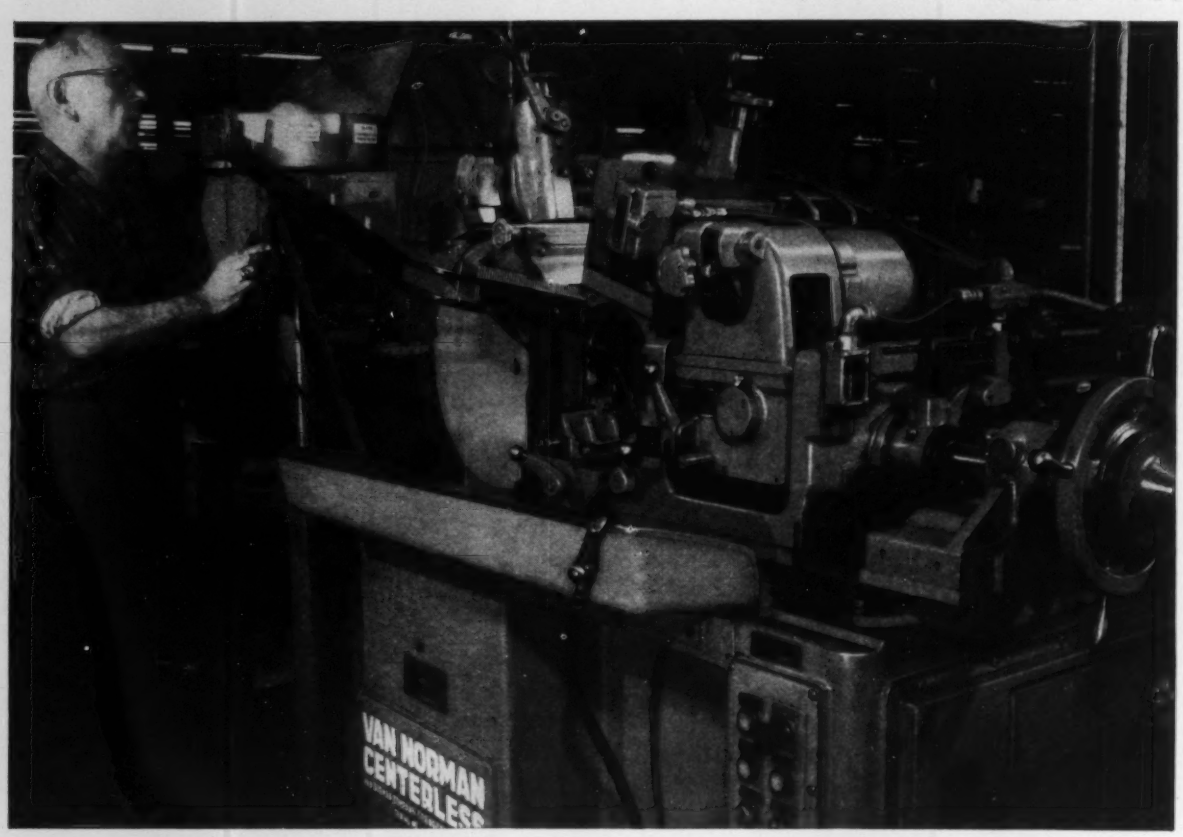
• Design features include vacuum load locks, ingot casting and unloading systems, and feed-material handling equipment.

The unit will process such metals as tungsten, molybdenum, columbium, tantalum, vanadium, hafnium, zirconium, uranium, nickel alloys, and stainless steels.

The company cites purification, grain refinement, increased ductility, and ease of fabrication as the most significant results of electron beam refinement. A high grade of feed stock is not required. The furnace can be charged with mill scrap, fines, metal powder, or sinter.

Furnaces of the type installed by Stauffer cost $35,000 to $175,000.

ANOTHER VAN NORMAN COST SAVING APPLICATION



BENDIX AVIATION BOOSTS SYNCRO SHAFT PRODUCTION 1200%

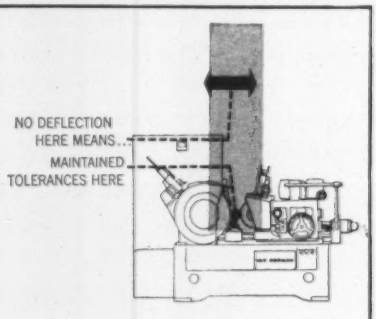
VN Centerless Grinding Cuts Production Operations... Inspection Time and Material Cost—Saves $9000 Annually

Bendix boosted hourly production of Autosyn syncro shafts to 600 per operator with a Van Norman Centerless Grinder. One Van Norman Centerless Grinder (with a specially developed automatic feed) replaced two manually fed machines, which produced only 50 shafts per hour.

Annual Savings $9,000—eliminating the need for highly skilled burnishing operators—100% inspection was eliminated. Concentricity control and improved tolerances were obtained with the Van Norman Centerless Grinder.

Faster Set-Ups... Increased Production... Greater Accuracy. The Van Norman Centerless Grinder is specifically engineered to produce more precision grinding per operator per work shift... designed for in-feed work, thru-feed work, crush form grinding and profile work. The Van Norman Centerless Grinder is rugged, and designed for heavy duty, long run production.

Send For Free Booklet—"Centerless Grinding," your local VN Franchised Distributor will be happy to discuss how VN Centerless Grinding may increase production and cut costs for you... call him NOW!



The Van Norman Diversimatic Centerless Grinder is engineered for performance from mounting base to the heavy duty, precision, antifriction unit type spindles.

VAN NORMAN MACHINE COMPANY

SPRINGFIELD 7, MASSACHUSETTS • DIVISION OF VAN NORMAN INDUSTRIES, INC.

2236

VN

Headstock Controls Featured on Redesigned Lathes

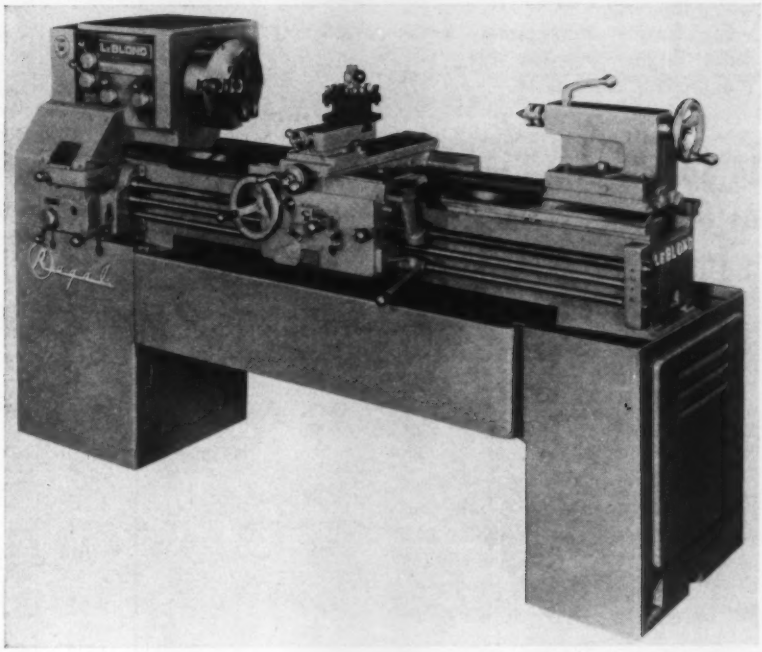
HEADSTOCKS of the redesigned Regal lathe line have controls that unite maximum ease of operation with maximum efficiency, says LeBlond.

The line includes ten models ranging in capacity from 13 to 24 in. and plain bed gap and sliding bed gap models in two sizes.

The lathes have many heavy duty features such as heavy, three bearing spindles, automatically lubricated and totally enclosed quick change boxes, and compensating V-ways to provide accurate carriage guidance and distribute cutting forces in the bed.

A complete line of accessories is available, including Regal Trace, which works from simple, flat templates.

For further information, *write* R. K. LeBlond Machine Tool Co., Madison and Edwards Roads, Cincinnati 8, Ohio.



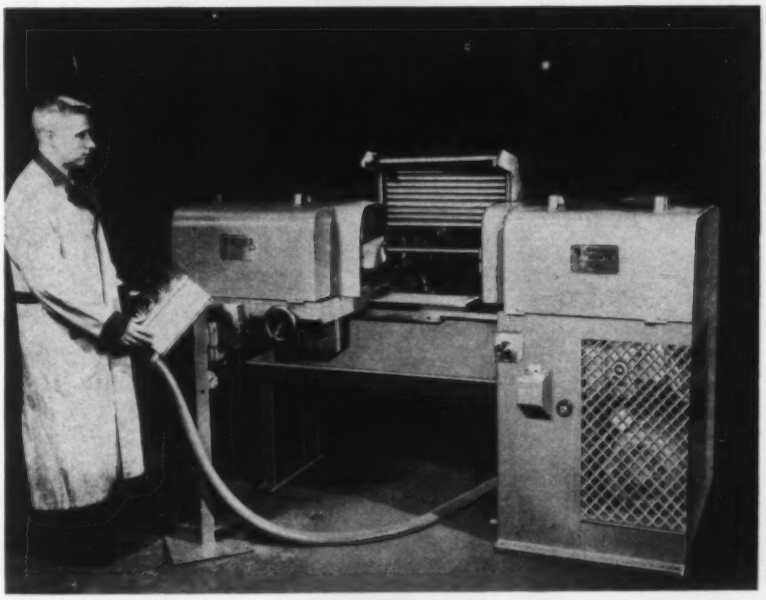
Unit Finishes Tube Ends Accurately, Quickly

HERE is a standard machine (Model 666) that was especially developed for high production, accuracy, and flexibility in the simultaneous finishing of both ends of tubes, rods, pipe, and similar work.

Typical operation: Inside-outside deburring, chamfering and facing, and other light forming or pointing.

Work is automatically fed into machining position by the hydraulically actuated Chute-Matic feed mechanism. Through the use of controlled hydraulic operation and positive depth-of-cut stops, length tolerances are held within 0.005 in. on a production basis.

The unit can handle diameters from ½ through 3 in. in lengths up to 60 in. with the standard bed machine (up to 120 in. with the extended bed machine). Adapters are available to accommodate work



shorter (down to 2½ in.) than the minimum length of 5 in.

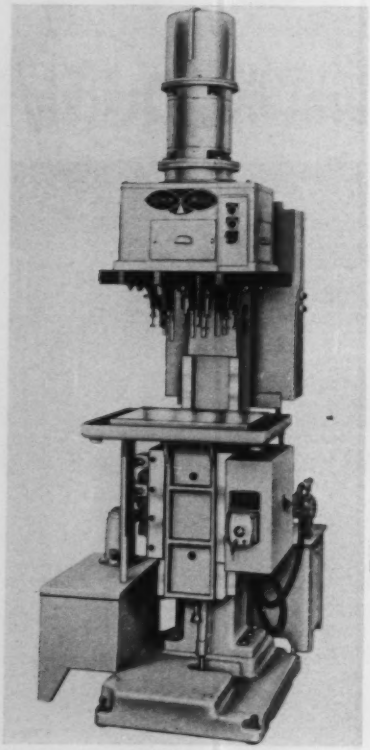
It can be arranged for chamfering or pointing of solid stock in diameters as small as ¼ in., producing common chamfer angles up to ⅛ in. maximum width cut.

For further information, *write* Pines Engineering Co. Inc., 601 Walnut St., Aurora, Ill.

14 Spindle Unit Can Tap At 60 Cycles a Minute

A HIGH speed, multiple spindle, tapping machine that performs up to 60 cycles a minute at 1600 rpm is ideally suited for all automated jigs and fixtures, says the maker.

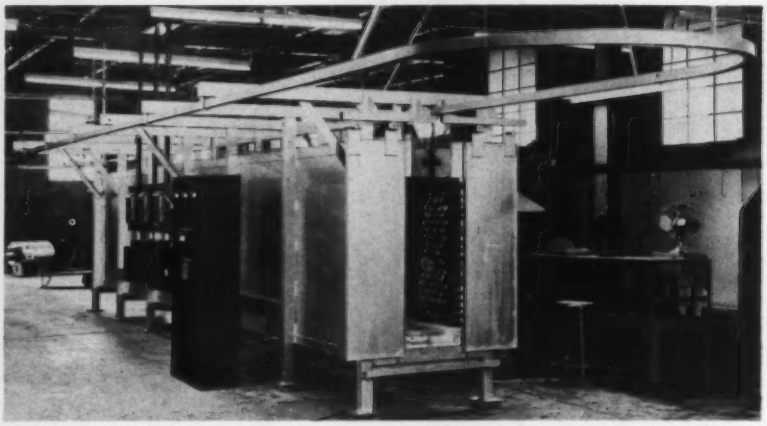
The 14 spindles are adjustable in any pattern within a head area of 7¾ x 12¼ in. A larger area can be reached by using adjustable, outboard bearing spindles. A template cluster box with slip spindles can also be provided. The tapper is driven by a special, severe duty, reversing motor capable of 240 empty plug reversals a minute. It is mounted by direct drive to the gearbox to assure quick, positive reversals and eliminate reversing mass such as idler gears or pulleys. The motor reverses electrically.



The hydraulically operated table can be set to accommodate various depths with a 6 in. stroke. The stroke can be held at the top of the cycle, leaving room to manually lower the table whenever necessary. The table and knee assembly can be adjusted over a 14 in. distance on the column.

Cycle selector switches permit the operator to raise and lower the table manually during setups, perform a single cycle (for checking work) or set the unit for automatic cycling.

For further information, *write* Precision Tool & Mfg. Co. of Illinois, 1305 S. Laramie, Cicero, Ill.



FURNACE-CONVEYOR COMBINATION AIDS PRODUCTION ENAMELING of metal parts such as furniture and appliance panels. The 30 ft unit permits continuous firing of sheet metal panels for both the undercoat and final enamel coat. Variable conveyor speed permits firing different enamels at different rates. The 225 kw furnace has a 6 ft preheat section, an 18 ft firing section, and a 6 ft cooling section. For further information, **write** Waltz Furnace Co., 1903 Symmes St., Cincinnati, Ohio

Cutter Holders Permit Faster Speeds and Feeds

AN IMPROVED model of Fli-Kut cutter holders is counterbalanced to allow faster speeds, feeds, and finer finishes. The unit is furnished in sets of three different sized holders with a plastic stand.

Using 5/16 in. carbide or high speed tool bits, the unit removes stock rapidly and can produce smooth finishes up to 6 in. wide in one cut, says the company. The ¾ in. shank size on holders is adaptable to most vertical mills.

For further information, *write* City Tool-Die & Mfg. Co. Inc., 132 Spencer Ave., San Jose 10, Calif.

Device on Rear Wheels Keeps Lift Truck Level

A COMPACT, 14 in., automatic drive and a hydraulic rear wheel leveling suspension are features of the M-40 fork lift truck.

It's a cushion tired, sit-down model with a mast that can lift a 4000 lb load to a height of 130 in. Gasoline and LP gas powered versions are available.

The two speed, Mobilmatic drive permits one lever control of direction and permits high or low gear

STEELMAKING AT JESSOP

Listen...

5...4...3...2...1...0...Lift Off!

The countdown is on.

Scientists and skilled technicians scan their instruments, alert to the least sign of malfunction.

Liquid oxygen has been piped into the fuel chamber of the gleaming Atlas ICBM poised on the launching pad. Other last-minute preparations are completed.

Tension mounts. It won't be long. Listen . . .

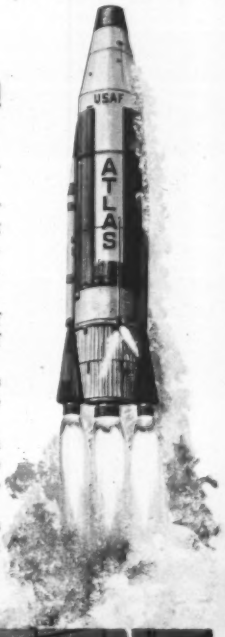
5...4...3...2...1...0...*Lift Off!*

The missile comes to life in a swirling cloud of vapor, exhaust and flame. The engine—capable of 360,000 pounds of thrust—roars thunderously.

Airborne now, the Atlas gathers speed and soars majestically on its predetermined course down the Atlantic range—a successful launching.

Jessop Steel Company makes several alloys used in the Atlas—steels forged and machined into precise but rugged mechanisms. And you will find Jessop steel in the launching pad "plumbing" too.

Swepco Tube Corporation of Clifton, N. J., makes piping for LOX systems that fuel the Atlas with liquid oxygen at temperatures of –300° F. to –320° F. *That's* punishment for any metal.



But Swepco's austenitic chromium nickel Rock-Forged pipe can take it. Ductility—to avoid fracture by reason of brittleness—is an all-important factor in this application.

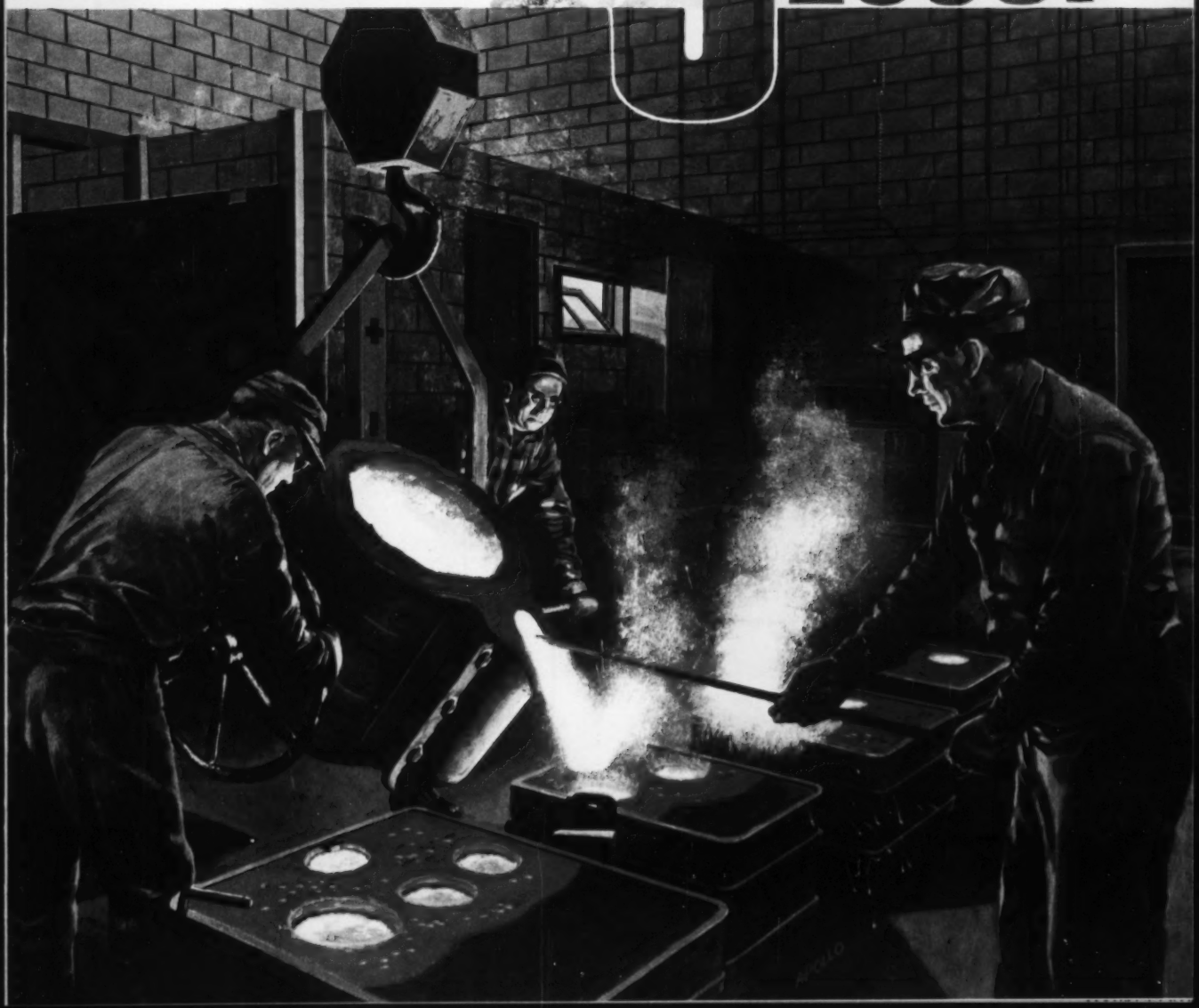
With a value of about 38 foot pounds by Charpy Impact Test, the piping supplied by Swepco handles the job with ease—with an added measure of safety against costly breakdown.

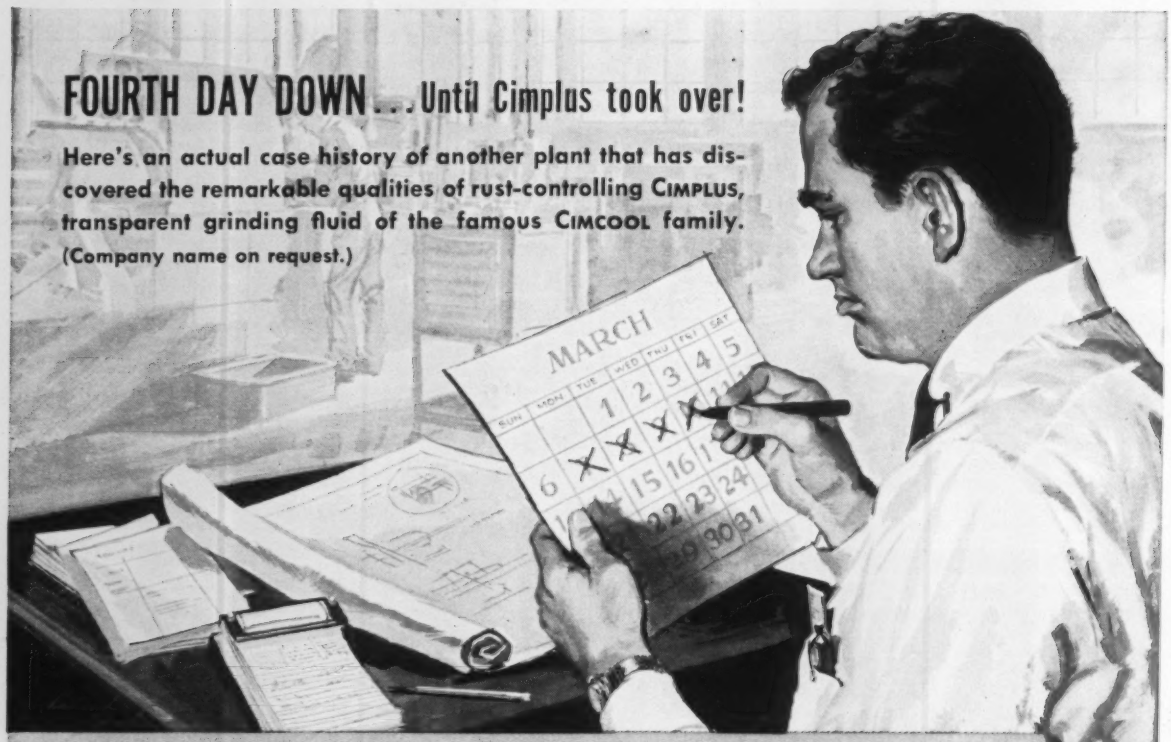
Swepco buys steel from Jessop for rock-forging. Why? Because through controlled chemistry and certain production techniques, Jessop and Swepco developed a steel second to none in workability in the cold forging process.

In making steel like this, experience counts . . . and Jessop has it. Call any of Jessop's 23 sales offices in North America and let us prove it to you.

Plants and Service Centers:
Washington, Pa. • Los Angeles • Chicago • Detroit • Owensboro, Ky. • Wallaceburg, Ont.

JESSOP





FOURTH DAY DOWN...Until Cimplus took over!

Here's an actual case history of another plant that has discovered the remarkable qualities of rust-controlling CIMPLUS, transparent grinding fluid of the famous CIMCOOL family. (Company name on request.)

FIELD SERVICE REPORT

The job was grinding cast iron machine tool parts on three rotary surface grinders with an 1800 gallon central cutting fluid system.

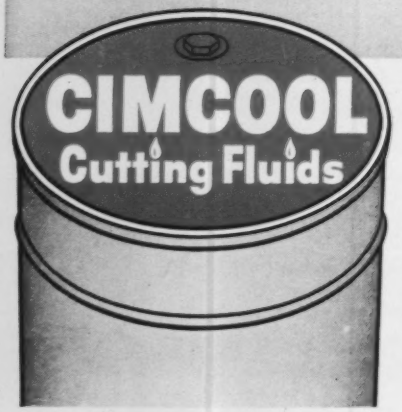
The coolant they had been using had let the sludge cake up and clog up the lines and they had been shut down for four days. Then we installed Cimplus at 100 to 1 dilution and the problem was solved.

Since Cimplus took over, they've had no sludge trouble at all. The swarf and grit settles nicely for them, but it doesn't cake. They're also real pleased with the rust prevention on the cast iron parts that Cimplus gives them.

Kent Reece

N. Y. Office

Page 2



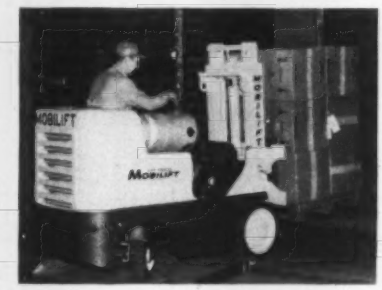
FOR 100% OF ALL METAL CUTTING JOBS

Production-proved products of The Cincinnati Milling Machine Co.

CIMCOOL S2 Concentrate — The pink fluid which covers 85% of all metal cutting jobs.
CIMPERIAL° — Newest in the famous, industry-proven line of CIMCOOL° Cutting Fluids.
CIMPLUS — The transparent grinding fluid which provides exceptional rust control.
CIMCUT Concentrates (AA, NC, SS) — For every job requiring an oil-base cutting fluid.
ALSO — CIMCOOL Tapping Compound — CIMCOOL Bactericide — CIMCOOL Machine Cleaner.

For full information on the complete family of CIMCOOL Cutting Fluids, call your CIMCOOL Distributor. Or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

°Trade Marks Reg. U. S. Pat. Off.



operation with no clutching or shifting. Speeds: 0 to 7 mph in low range and 0 to 11 mph in high range.

Each rear wheel is independently suspended from an oil cylinder mounted to the outer frame of the unit. Benefits: Slipping is eliminated, traction is improved, and tire life is extended.

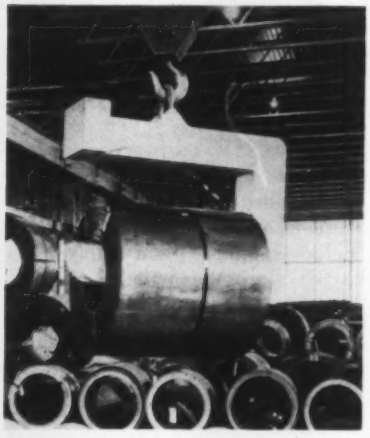
Outside turning radius is 80 in., width is 39 in., length (less forks) is 82½ in.

For further information, *write* Motec Industries Inc., Hopkins, Minn.

Hooks Designed for Easy Coil Handling

A SERIES of C hooks has been designed for moving heavy, cumbersome strip and sheet coils. The units provide balance and enable the crane operator to easily insert the hook into coils. Result: Reduced labor costs and faster handling.

The hook jaw has a round edge, making only a two point contact on the coil ID to prevent damage to stock. The manufacturer claims the C hook technique can improve the safety factor as much as 5:1.



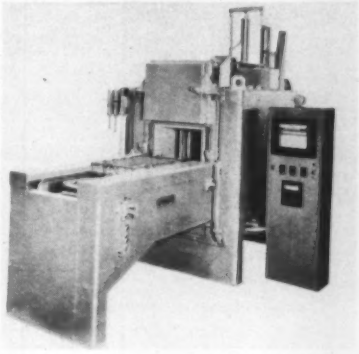
The hooks are available in nine sizes with capacities ranging from 5000 to 15,000 lb. Special sizes are available. Each unit is supplied with a safety stand.

For further information, *write* Jarke Mfg. Co., 6333 Howard St., Chicago 48, Ill.

Furnace Heat Treats, Brazes Up to 1850° F

DESIGN improvements which help to speed production and reduce maintenance cost are claimed for the Hevi-Duty, Clean-Line furnace.

The unit is designed for carbonitriding, carburizing, bright hardening, annealing, normalizing, and brazing of metal up to 1850° F.



One important feature is a short loading table (one basket long) which helps to save floor space. A two basket table is also available. An optional double heating chamber, separated by a sliding door, makes it possible to maintain two independent atmospheres and two different temperatures.

With the controls and cycle timers set, the furnace will automatically heat work at a predetermined temperature under a prepared atmosphere, hold for the time selected, and then move the load to the quench chamber for oil quenching or cooling under atmosphere. When the selector is set for an oil quench, the work is automatically lowered into the bath, held there the desired time, then raised to drain position.

The complete unit consists of an automatic loader and transfer mechanism, heat treat furnace, atmosphere cooling chamber, oil quench tank with automatic quench elevator, forced agitation oil pump, oil cooler, and control panel.

For further information, *write* Hevi-Duty Electric Co., 304 Hart St., Watertown, Wis.

Tube Furnaces Provide Zone Control to 2822° F

TUBE FURNACES (nonmetallic resistor units) can be equipped with silicon carbide or alumina tubes in sizes up to about 8 in. in diameter and 72 in. long.

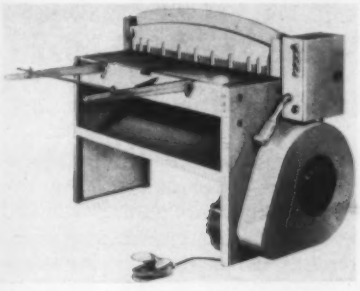
Units using silicon carbide tubes in sizes up to 2 in. ID do not require resistors other than the tubes. Doors are provided at both ends, facilitating replacement of tubes and diameter changes. The furnaces provide zone control to 2822° F.

For further information, *write* Harrop Precision Furnace Co., 3470 E. Fifth Ave., Columbus 19, Ohio.

High Speed Power Shear Usable on Runout Lines

CUTTING action that takes place within 1/5 of a second is featured on the Di-Acro Power Shear No. 48. Ferrous and nonferrous material up to 50 in. wide and as heavy as 16 gage mild steel can be sheared at rates up to 160 strokes a minute. Speed of the machine makes it adaptable for use on conveyor and runout lines, says the company.

Instantaneous cycling is possible because the shear is equipped with a self-adjusting electric clutch built into the flywheel and connected directly to the motor by a triple V-belt drive. Shearing to die accuracy is another claimed advantage. Shear blades are at an angle so only the blade edge is in contact with the material. A hold-down bar in front



of the blades operates automatically and acts as a safety guard and a material clamp. The hold-down has individual spring loaded feet to compensate for various thicknesses of material.

For further information, *write* O'Neil-Irwin Mfg. Co., 619 Eighth Ave., Lake City, Minn.

Positioning Machine Holds Assemblies up to 2000 lb

WELDMENTS and other assemblies weighing up to 2000 lb can be mounted on a motor driven turntable for precise positioning and rotation during welding or fabrication operations.

Preselected angular positioning of the table from vertical to 15 degrees beyond the horizontal can be automated by simply adjusting a control protractor, then pushing a button that energizes a drive motor.

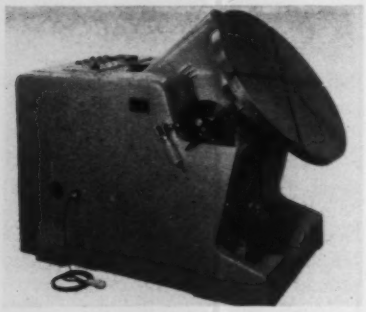
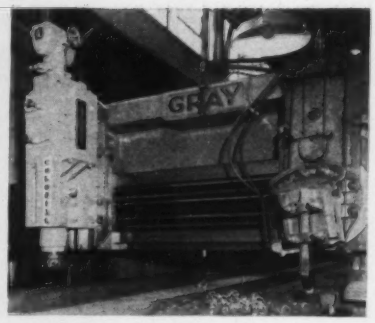


Table rotation is also pushbutton operated. A control knob permits selection of rotation speed from 0 to 4 rpm. Speed is checked visually on a meter calibrated in rpm. The unit is 53 in. long, 34 in. wide, and 46 in. high.

For further information, *write* Boesch Mfg. Co., Danbury, Conn.

Milling Spindle Maintains Constant Horsepower

TORQUE increases in direct proportion to speed reduction on the Colonial contour milling spindle. Result: Constant horsepower regardless of speed. The company



says the combination of infinitely variable speed with constant hp enables the operator to meet any combination of spindle requirements regardless of cutter demands and rated horsepower at any speed. Standard units run from 10 to 50 hp. Other sizes are available.

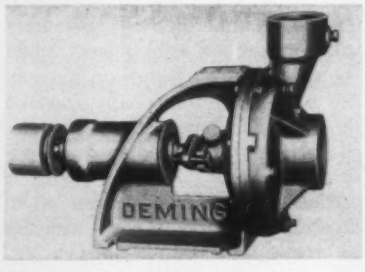
For further information, *write* Contour Mill & Spindle Div., Colonial Broach & Machine Co., 21601 Hoover Rd., Warren, Mich.

Centrifugal Booster Pump Handles up to 300 gpm

CAPACITY of the Deming centrifugal booster pump ranges from 10 to 300 gpm. It can handle heads up to 150 ft. The pump has double ball bearings. Belt or direct motor drive can be used.

The semiopen impeller is mounted on a stainless steel shaft with a precision taper fit for perfect alignment and easy removal. A back pullout feature permits working parts to be pulled without disconnecting casing from piping.

Stuffing box and split gland are standard. A mechanical seal is available at no extra cost. The seal is recommended for temperatures up to 180° F when handling nonabrasive fluids. A 4 in. combination pulley (flat or V-belt) can be ordered. The pump is normally furnished for righthand operation. All but the 3 in. size can be



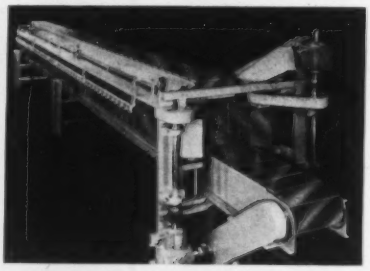
obtained for lefthand operation. The unit is suitable for booster operation when suction pressure does not exceed 25 psi.

For further information, *write* Deming Co., Salem, Ohio.

Metal Belt Conveyors Have Automatic Takeup

THE COMBINATION of four Armorbelt metal belt conveyors is useful for such applications as a takeoff unit for an extruder or for the continuous foaming of plastics such as rigid polyurethane.

The height of the rectangular cross section is easily adjusted by raising or lowering the top conveyor.



Adjustable spring mounting of the top conveyor compensates for variation in output of the extruder or foaming head and also permits control of working pressure. Variable speed drives are available with remote controls and speed indicators to maintain precision. Automatic takeup compensates for temperature variation. Stainless steel belts eliminate contamination or staining of products.

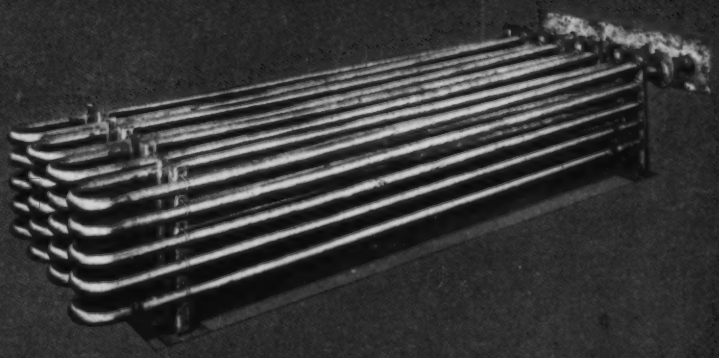
For further information, *write* M-H Standard Corp., 515 Communipaw Ave., Jersey City 4, N. J.

Unit Tests Metals, Glass, Ceramics Ultrasonically

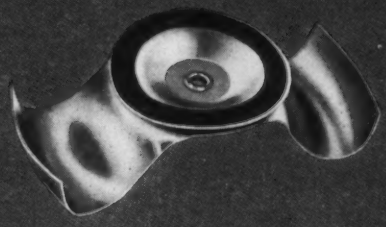
ULTRASONIC testing of plates, ingots, pipe, tubing, forgings, castings, welds, rolled shapes, honeycomb, extrusions, and other reasonably elastic materials (glass, hard rubber, ceramics) can be handled by the Model 424-D Immerscope.

Facilities are built in for high sensitivity, high resolution contact testing. Other features include a variable pulse repetition rate, a high

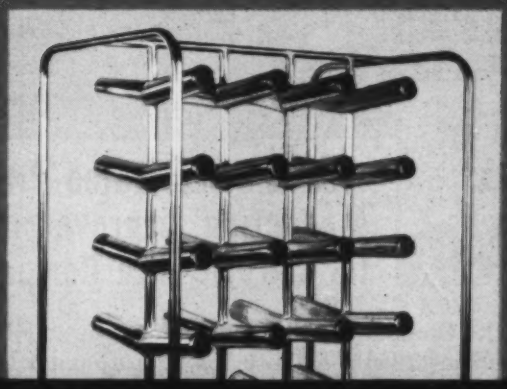
you can bend it...



you can form it...



you can weld it...



but you can never, no never, change its **consistent uniformity!**

...no matter what test you put it to, you'll get consistent performance, greater output, better quality and more profit with **Carpenter Specialty Stainless**.....produced by one of the leaders of stainless steels for industry.

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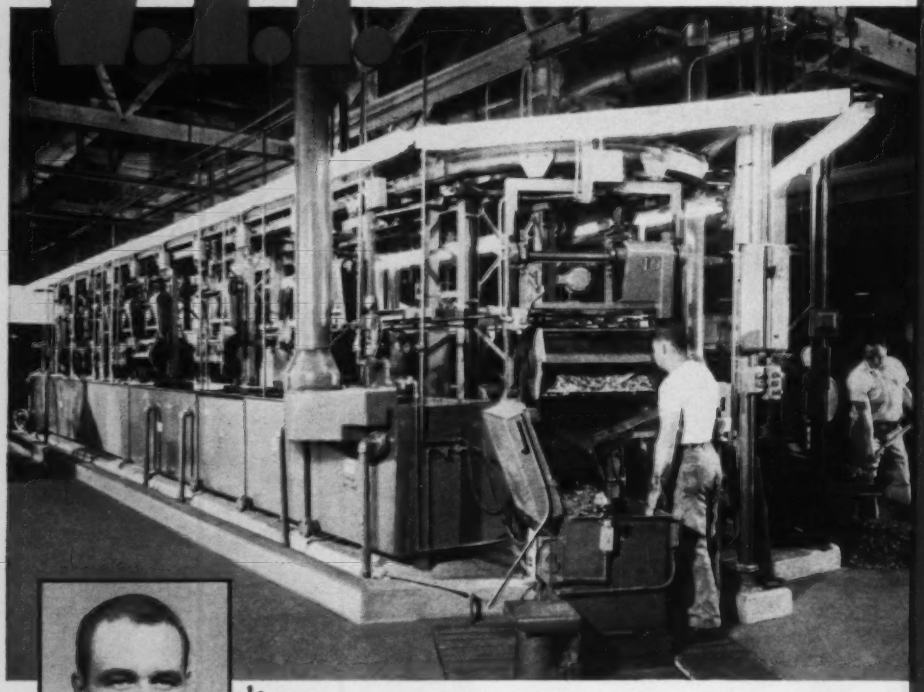
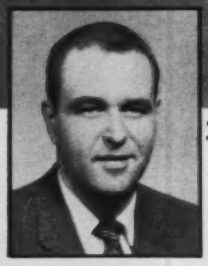
The Carpenter Steel Company, Main Office and Mills, Reading, Pa.
Alloy Tube Division, Union, N. J.
Webb Wire Division, New Brunswick, N. J.
Carpenter Steel of New England, Inc., Bridgeport, Conn.

V.I.P.*

CUTS LABOR COST 60%, REDUCES MATERIAL COST 15%!





*Variable Integrated Processing steps-up production, improves plating efficiency for Chrome-Rite Company

Chrome-Rite Company, Chicago, Illinois, a large job plating shop, recently selected and installed a Udylite V.I.P. Automatic Barrel Plating Machine to replace a manual line for zinc plating bulk parts.

"We find that our direct labor cost has been cut 60% while the cost of materials has decreased approximately 15%", writes Bill Crawford, Vice President. "In addition, we are now able to handle about 99% of our zinc plating volume on the new V.I.P. and maintain an even more consistent high finish-quality than ever before."

Experienced plating men like Bill Crawford are quick to note the many production plating advantages of the V.I.P. You, too, should consult your Udylite Sales Engineer for complete information on the versatile V.I.P. Call him today. Or, write:

Udylite corporation
detroit 11, michigan

world's largest plating supplier

udylite

speed flaw alarm, a built-in video delay circuit, and built-in recorder output circuits for direct connection to Curtiss-Wright Electrosensitive recorders.

For further information, *write* Princeton Div., Curtiss - Wright Corp., P. O. Box 110, Princeton, N. J.

High Speed Steel Cuts High Temperature Alloys

A HIGH speed steel, Braecut, is double tempered up to 70 Rockwell C. A moderate carbon content gives it considerable toughness. In one application, a 50 Rockwell C alloy was machined efficiently.

Alloying elements in percentages: Carbon, 1.15; chromium, 4.25; vanadium, 2.25; tungsten, 5.25; molybdenum, 6.25; and cobalt, 12.00.

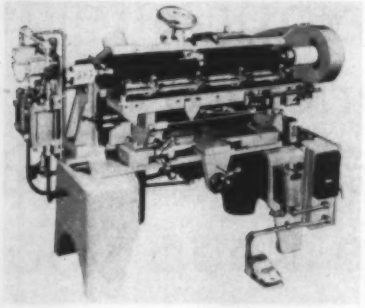
The company reports applications under test include broaches, drills, form cutters, hobs, end mills, chasers, taps, reamers, and counterbores.

For further information, *write* Braeburn Alloy Steel Corp., Braeburn, Pa.

Unit Surface Finishes Small, Intricate Shapes

THE MODEL 405, table type, surface finishing machine is smaller and more flexible than the Model 303 made by Clair.

Reversible rolls as small as 1¾ in. in diameter are available. Table actuations are adjustable to extremely high frequencies and sensitive contact pressure is automatically variable over any predetermined increment of coverage. The small and intricate shapes the unit can batch finish mechanically include decorative hardware, hand tools, and tableware.



For further information, *write* Clair Mfg. Co. Inc., Olean, N. Y.

Variable Speed Drives Permanently Lubricated

ALL BEARINGS on the Sterling Lube-Free variable speed drive are factory lubricated, sealed, and shielded. Shaft surfaces are impregnated with a tough, wear resistant material. Nonmetallic bushings are also fabricated from wear resistant material.

Units are available from ¼ to 25 hp and with output speeds from 4660 down to 0.4 rpm in variations up to 10:1. You can choose from dripproof, totally enclosed fan cooled, and explosionproof models.

For further information, *write* Dept. B-1, Sterling Electric Motors Inc., 5401 Telegraph Rd., Los Angeles 22, Calif.

Hydraulic Fluid Filter Cleans up to 170 gpm

HYDRAULIC fluids (petroleum based and others) can be filtered down to 3 microns at rates up to 170 bpm (continuous flow) by the Triphane filter assembly. The company says no recirculation or preliminary filtration is required.

The basic unit is a combination Fiberglas membrane, primary throwaway cartridge. The primary cartridges are protected by corrugated, sintered woven wire mesh elements during element changes and in the event the primary cartridges are damaged or omitted.

For further information, *write* Aircraft Porous Media Inc., a subsidiary of Pall Corp., 30 Sea Cliff Ave., Glen Cove, N. Y.

Unit Bends Web for Joists

BENDING the web in steel joists and the stirrups used to support the joists are jobs for the Wallace No. 35 bender. Maximum capacity: Two ¾ in. round bars.

The bender drives under full power both clockwise and counterclockwise. It's operated by one hydraulic foot valve that permits the operator full use of hands for positioning the work prior to bending.

Two adjustable stops for clockwise and counterclockwise bending are supplied. The unit is rated at 5 hp and has 13 to 15 rpm at the bending head. Minimum radius to near edge: One-half the bar diameter. Floor space requirements are 38¾ x 58 in.

For further information, *write* Wallace Supplies Mfg. Co., 1304 W. Diversey Parkway, Chicago 14, Ill.

Solder in Paste Form Works on Stainless Steel

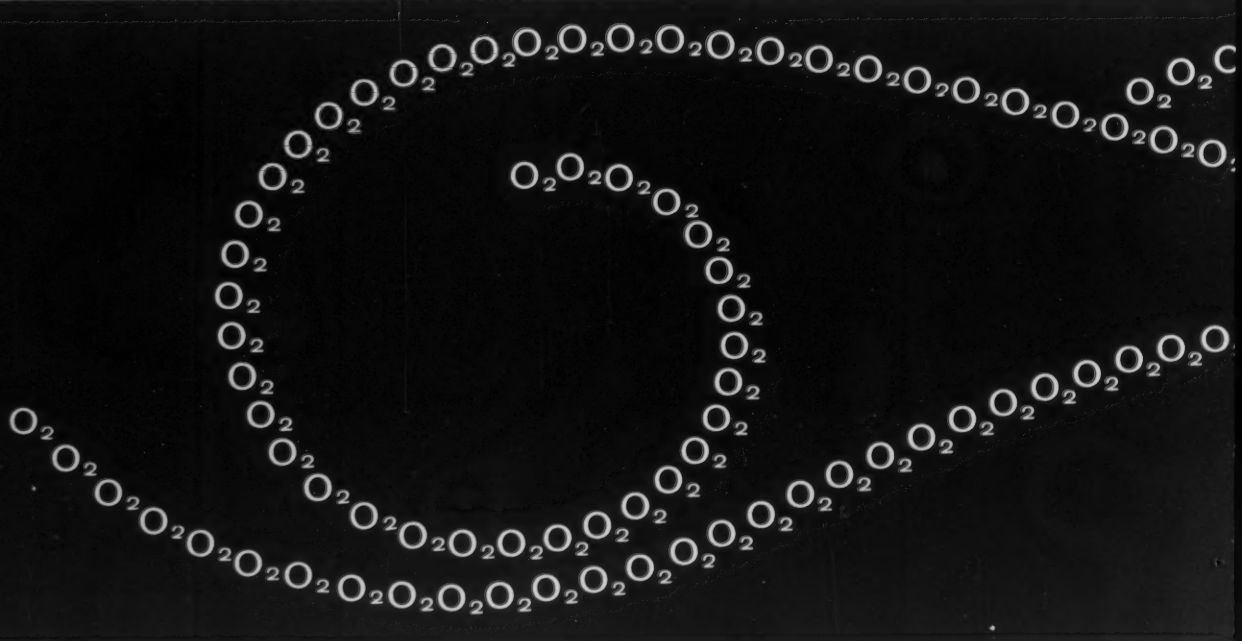
A PASTE solder for stainless steel has the solder alloy, flux, and neutral binders in suspension. The manufacturer says dipping in water while hot, or soaking in water when cold, will remove all active residual particles after soldering.

The material (WC Series) is suitable for use with Fusion Engineering automatic applicators. The company says tough jobs such as soldering stainless steel grades 304 and 430 can be handled automatically with the paste. Another advantage of the paste: Ability to hold the solder alloy in place—even on vertical surfaces.

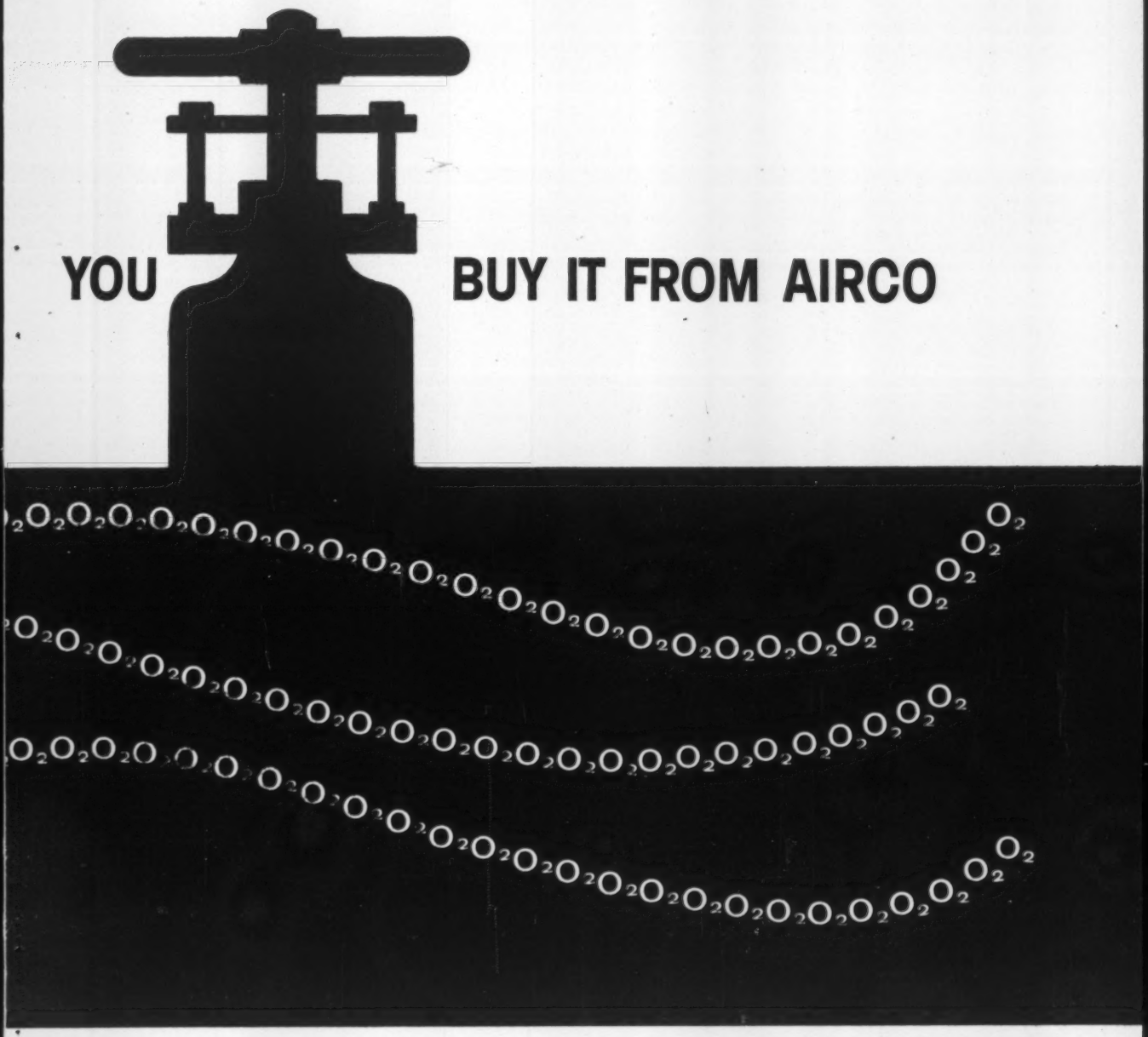
For further information, *write* Fusion Engineering, 17921 Roseland Ave., Cleveland 12, Ohio.

O_2

OXYGEN FOR STEEL IS ALWAYS ON TAP WHEN



Oxygen piped from a plant we build and operate, on or adjacent to your site, is backed by 45 years of experience in air separation. We have the resources and sound engineering ability to keep your



oxygen flowing even if your needs increase.
For the full oxygen story, contact Airco.

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NEW literature

Write directly to the company for a copy

Special Steels Data

Heppenstall special steels T716, T717, and T719 are described in three data sheets. General characteristics and typical applications of each grade, together with instructions for forging, annealing, hardening, tempering, and other information are included. Heppenstall Co., 4620 Hatfield St., Pittsburgh 1, Pa.

Wide Belt Data

"Wide Belt Finishing" recites case study results where use of wide belts and wide belt machines for both woodworking and metalworking cut costs and expedite production while maintaining quality. Dept. BMD, Carborundum Co., P.O. Box 337, Niagara Falls, N. Y.

Steel Selection and Treatment

"Three Keys to Satisfaction," is a revised guide (77 pages) to combining sound design principles, proper selection of steels, and good treatment to achieve optimum economy and material performance. Climax Molybdenum Co., division of American Metal Climax Inc., 1270 Avenue of the Americas, New York 20, N. Y.

Military Specs Catalog

References on more than 450 specifications in the fields of lubrication, hydraulics, corrosion prevention, and similar specialized areas are listed in a catalog. Military specification equivalents for about 300 aeronautical (AN-), Air Force, Army, Navy, SAE, and Aerospace manufacturers' specifications are also given. Bray Oil Co., 3344 Medford St., Los Angeles 63, Calif.

Nut and Bolt Data

"Inside Story of Greater Strength; Shaping Metals That Shape Your Future," 14 pages, explains the different strengths involved in metal bolts and nuts. H. M. Harper Co., 8200 Lehigh Ave., Morton Grove, Ill.

Adhesive Specs

A 54 page catalog lists U. S. government specifications for a wide variety of adhesives, coatings, and sealers. Listed in numerical form are military specifications, definitions, intended application and the corresponding 3M adhesive, coating, or sealer that meets those specifications. Adhesives, Coatings & Sealers Div., Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul, Minn.

Space Age Silicones

"Silicones for the Space Age," (CDS-276), illustrated (photos and charts), enables the user to quickly decide what silicone compound will fit his application. Also included are comparative data pertaining to silicones and other compounds as high temperature insulating materials. Silicone Products Dept., General Electric Co., Waterford, N. Y.

Design and Tooling Handbook

The purpose of this handbook is to increase the understanding of the Fourslide process for forming wire and ribbon metal. It's written for the production manager, the industrial or manufacturing engineer, the tool engineer, product designer, and operator. A. H. Nilson Machine Co., 600 Bridgeport Ave., Shelton, Conn.

Chemical Cleaning

"Chemical Cleaning of Boilers, Auxiliaries, and Heat Exchangers," 12 pages, discusses importance of chemical cleaning to efficient operation and extension of useful service life of much powerplant operating equipment. Dow Industrial Service Div., Dow Chemical Co., 20575 Center Ridge Rd., Cleveland 16, Ohio.

Plastic Die Steels

Properties and selection of plastic die steels are described in a new booklet. It shows diemakers how to match die steels to jobs. Advertising Dept., Vanadium-Alloys Steel Co., Latrobe, Pa.

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precision shafting costs?
LET UNIVERSAL
SUPPLY AND GRIND IT
Eliminate double purchasing and re-handling bar stock for precision finished straight shafting. Universal's quote on stock and finish will delight you . . . and there's no delay.
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NEW BOOKS

Digest of Military Electronics, RCA Service Co., Government Services, (Bldg. 210), Camden 8, N. J., 210 pages, $3.95

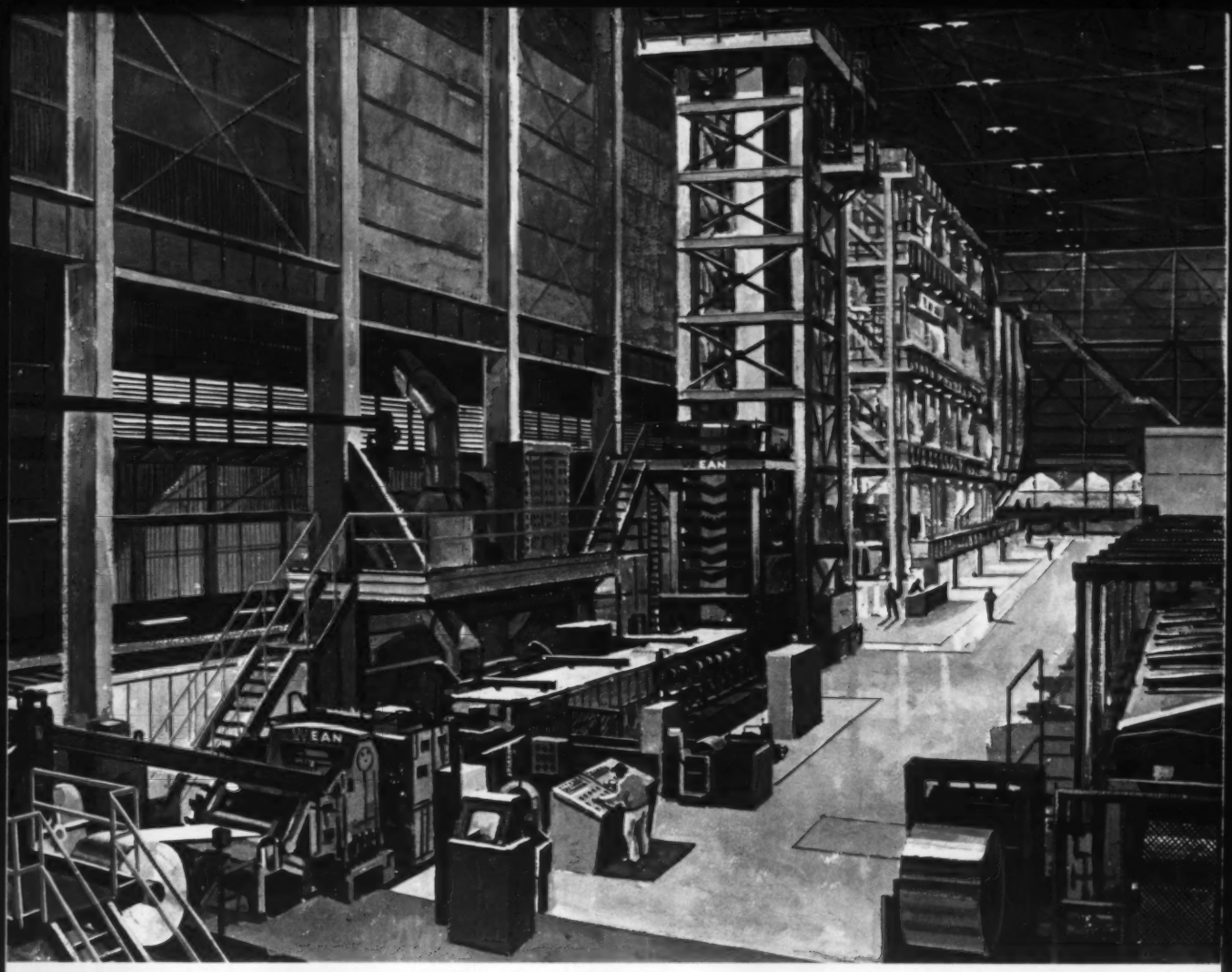
Many uses of electronics in modern military equipment and systems are explained. Devices and systems such as LORAN, SONAR, ILS, BMEWS are presented in alphabetical order. The purpose and function of each is explained briefly and simply from a system standpoint.

Marketing Definitions, American Marketing Association, 27 E. Monroe St., Chicago 3, Ill., 24 pages, $1; $2 for nonmembers

The glossary of commonly used terms in marketing represents the composite thinking of more than 75 authorities. It's the third issued since 1933, when the association first attempted to establish some uniformity in terminology.

Nuclear Fuel Element Development (1960 H. W. Gillett Memorial Lecture), American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa., 14 pages, $1

Progress made in nuclear field element development is reviewed and problems that remain are cited. The lecture was presented at the 63rd annual meeting of the American Society for Testing Materials.



PORTRAIT OF PROGRESS: *Wean Tin Plate Annealing Line at J&L's Aliquippa Works*

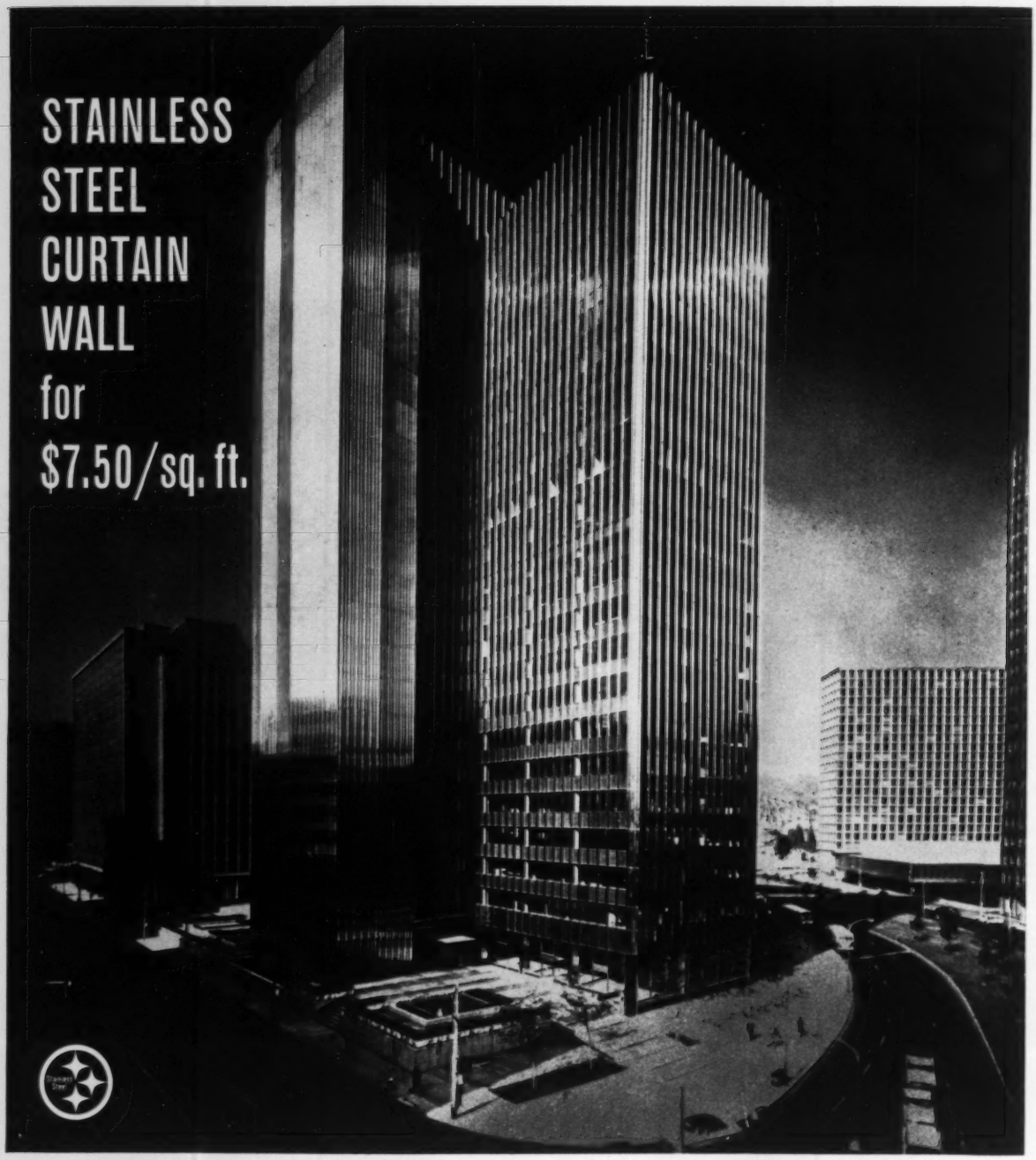
J&L Cuts Production Time, Improves Quality with Wean Tin Plate Annealing Line

Jones & Laughlin Steel Corporation's new Wean tin plate annealing line is a major part of the company's tin mill modernization at Aliquippa. Continuous annealing on the Wean line enables J&L to fill tin plate orders far more quickly than was possible with the slower batch annealing process. And the Wean line gives uniformly annealed strip for higher quality finished output.

Operating at speeds up to 2,000 fpm, the line can handle 50,000 lb. coils with a maximum O.D. of 85". Accurate *zoned* tension control is maintained by passing the strip through six, electrically-interlocked, precision bridles. A unique system for removing heavy-end scrap utilizes two uncoilers which may be shifted laterally to permit winding the heavy ends on a scrap reel located outside of the line.

Wean "creative engineering" has accounted for much of the development work that has established continuous annealing as a standard processing operation in the steel industry. The Wean Engineering Company pioneered in this field and has built more continuous annealing lines than all other manufacturers combined. This experience is ready to serve you.

THE WEAN ENGINEERING COMPANY, INC. · WARREN, OHIO



Pittsburgh's Four Gateway Center is one of the most dramatic architectural uses of stainless steel in the world today. Even more dramatic to the architect, builder and owner is the remarkably low $7.50 per sq. ft. erected cost of the stainless steel curtain wall.

Washington Steel's gray ColorRold provided the means for accenting the vertical lines that make this edifice one of the most talked about buildings of our era.

4 Gateway Center, Pittsburgh
Harrison & Abramovitz, *Architects*
Limbach Co.,
Curtain Wall Contractor

WASHINGTON STEEL CORPORATION

and ColorRold®

PRODUCERS OF *MicroRold®* STAINLESS SHEET & STRIP

WASHINGTON, PA.

Users Bet on Orderly Upturn

THE SPEED of the steel industry's recovery in the second quarter may be influenced more by the spacing of new orders than by their aggregate tonnage.

If the gradual tapering off of inventory liquidation is accompanied by a gradual and orderly upswing in steel buying, steel producers will accommodate the growing demand by gradually upping their output and without extending delivery promises significantly. They'll boost their operations from this month's average—55 per cent of capacity—to about 60 per cent in April and 65 per cent in May.

But if a great many consumers start buying at once and sending their orders to the mills in bunches, no miracle of production scheduling will be sufficient to prevent backlogs from accumulating and deliveries from lengthening. As leadtimes stretch, consumers who have been living hand to mouth will realize that they must carry inventories that are big enough to sustain their operations for longer periods. Their concerted efforts to build inventory might worsen the supply situation unless the mills could somehow keep pace. They would certainly try—and that's why there is a possibility that steelmaking's upward creep may turn into a surge.

CUTBACKS ENDING—The steel inventory liquidation that started last May, when consumer stocks were at a poststrike peak of about 18.5 million tons, is tapering off but hasn't stopped altogether. In January, the latest month for which figures are available, mill shipments to domestic consumers were only 4.5 million tons. Imports are estimated to have been about 200,000 tons, so buyers (including service centers) received no more than 4.7 million tons from all sources of supply. They consumed about 5.5 million tons, thereby reducing their inventories by as much as 800,000 tons. Last month, consumption dropped at least 10 per cent while shipments stayed close to January's, so there wasn't so much liquidation. This month, consumption is moving up again, but so are shipments. Result: The net reduction of inventories will again be relatively small.

By Mar. 31, consumer stocks will drop to about 9 million tons, predicts Alan Greenspan, head of the New York economic consulting firm of Townsend-Greenspan & Co. He believes that inventories are lower now than they have been at any time since the 1949 recession.

SERVICE CENTERS SHARE—Although distributor stocks of steel are about 1 million tons less than they were last June, at the poststrike peak, they're probably at an all-time high as a percentage of total available inventories. The 9 million ton estimate of consumer stocks includes 2.8 million tons at service centers, 31 per cent of the whole.

USERS GAMBLING—STEEL's latest survey of inventories (see Page 61) confirms that steel users have "low to average" stocks of raw materials and finished products. Some companies say they're starting to buy steel again—in one firm's case, after almost a year's absence from the market. Others indicate that they'll do a little more trimming. There's a general feeling that the mills have enough capacity to maintain fast deliveries in the face of foreseeable demand. But many users admit that it wouldn't take more than a 10 to 15 per cent increase in orders for their products to cause them inventory hardships.

OUTPUT OFF SLIGHTLY—Look for ingot production in the week ending Mar. 25 to equal the 1,570,000 tons that STEEL estimates the industry poured in the week ended Mar. 18.

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*Current prices were published in the Mar. 13 issue and will appear in subsequent issues.

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'Old' Markets Bolster Vanadium Outlook

PRODUCERS of vanadium are having their ups and downs. Their No. 1 market for the material (as an alloy in steelmaking) is expected to grow steadily. But the short term outlook for a new market (Space Age structurals) isn't as bright as it was a year ago.

No one is writing off the structural market, but interest in it seems to have subsided for the moment. Two quotes sum up the situation:

"We are no longer paying much attention to (structural applications) because we have other irons in the fire that look hotter," says a fabricator.

"Other metals on the market now will do a better job in most areas where we thought there might be a market for vanadium," adds another.

There are no technological barriers to the metal's use as a structural material. (Vanadium metal is sold in two grades, one for alloying and a high purity grade that's used chiefly in structural applications.) It's also one of the easiest of the refractory metals to fabricate. One problem: At 1200° F, vanadium pentoxide, the oxidation product, begins to melt. A coating could probably be developed to improve temperature resistance, but there's little incentive to find one because other metals already have the property. Price is another disadvantage: The high grade metal costs about $35 a pound.

The Atomic Energy Commission is the biggest user of the high grade metal. The applications are experimental and classified. The best guess is that the annual market is 36,000 to 40,000 lb—that's eight times higher than it was two years ago.

• **Traditional Markets**—The bulk of vanadium usage will continue to be in foundries and the steel industry, where the metal is applied as an alloy addition to such products as castings, tool steels, high speed steels, construction alloy steels, carbon steel, and stainless.

Demand began to slump in the latter part of 1960 as steelmaking operations eased off, but U. S. consumption still hit 4.1 million lb vs. 3,782,000 lb in 1959. Demand has been on a steady uptrend the last several years.

Exports have helped vanadium makers—they have about quadrupled over the last 18 months. Exports hit 7.6 million lb last year compared with 2,784,400 lb in 1959, 1,414,000 lb in 1958.

Production reflects the improved business. U. S. output reached around 11 million lb last year, the best mark since 1956.

• **Plenty of Vanadium**—The U. S. is self-sufficient and supplies look more than adequate for the foreseeable future. Today, all vanadium in the U. S. is obtained as a by-product of uranium mining. After 1966, when government uranium subsidies expire, producers will have to mine vanadium for itself. That will pose problems, but they shouldn't disrupt either supply or price significantly.

• **Pure Metal**—It's possible that the high purity metal (for structural use) may be used in the fast breeder reactor, suggests Dr. Edward Epremian, technical co-ordinator, Union Carbide Metals Co., a division of Union Carbide Corp.

Here's why: Vanadium is one of the easiest of the refractory metals to fabricate. It can be welded, bent, forged, extruded, drawn, rolled. It has fair thermal conductivity and good mechanical strength up to 1000-1200° F. Its nuclear absorption properties are not as good as those of zirconium, but that's relatively unimportant in the fast breeder reactor, explains Dr. Epremian.

The No. 1 potential civilian market: The use of high purity vanadium as an interlayer between titanium and carbon steel in chemical processing equipment. Titanium is the corrosion resistant material; steel is the backup. Vanadium allows a satisfactory joining of the two, without impairing the corrosion resistance of the weld.

"Interlayer welding consists basically in welding vanadium to steel, then welding titanium to the vanadium," says Titanium Metals Corp. of America, which developed the process. "The vanadium can be used in the form of plugs when fusion techniques are preferred, or as foil when spotwelding procedures are employed."

Miscellaneous uses (they're mostly experimental) include:

- Vanadium foil to screen out certain types of rays in x-ray work.
- A classified use in military aircraft.
- Vanadium skids on the Air Force's supersonic sled.

• **Third Type**—For a while it looked like vanadium (in oxide form) might find an early market as a catalyst in antismog devices. But researchers found that while the device worked, it was too costly. Susquehanna Corp., Chicago, still feels vanadium has a potential market here. Other uses for the oxides are as a catalyst in the manufacture of sulfuric acid, in the manufacture of nylon, and as a rust inhibitor.

• **Research**—A lot more work has to be done, particularly in alloying the metal. Reports indicate some promising alloys with high strength at intermediate temperatures are being researched. The U. S. Bureau of Mines reports the metal has good resistance to aerated salt water.

The bureau also makes this statement: "Since the metal has two primary requisites for a material of construction—reasonable mechanical and chemical stability—there will undoubtedly be applications for which it will be fitted. The use of high purity and ultrapure vanadium as an alloying element in steel and with nonferrous metals, free from undesirable impurities, could also lead to important new engineering materials."

Four companies produce the pure metal: Union Carbide Metals Co., Vanadium Corp. of America, Shieldalloy Corp., and Oregon Metallurgical Corp.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 144 & 145

While automotive and appliance demand for sheets is down, buying is picking up a little, producers report. Cold rolled sheets are moving at a slightly faster pace than hot rolled. They're going into a variety of stamping operations and diversified manufacturing.

Galvanized sheet demand is being stimulated by agricultural requirements and a stepup in air conditioning equipment manufacture.

Deliveries on hot rolled sheets can be had within two weeks, cold rolled within two to four weeks, galvanized within three to four weeks.

Jones & Laughlin Steel Corp., Pittsburgh, booked 190 tons of alloy sheets for delivery to the Military Industrial Supply Agency, Navy, Philadelphia. Eastern Stainless Steel Corp., Baltimore, booked 60 tons of stainless, and Acme-Newport Steel Co., Newport, Ky., 110 tons of alloy sheets for the Naval Ordnance Plant, Louisville.

Tin Plate . . .

Tin Plate Prices, Page 145

Demand for tin plate continues strong and is certain to improve in the next few months as can inventories are built up for the summer canning season.

Inland Steel Co., Chicago, has joined the list of producers of thin tin plate. On Mar. 8 it announced the availability of thINtin. The price is the same as that quoted by other makers. The material is to be produced in coils of 12,000 lb and over and widths of 28 to 35 in.

Inland regards oil cans and beer cans to be the two big market areas for the product.

Plates . . .

Plate Prices, Page 143

Improved construction activity and a mild pickup in demand for storage tanks and home heating units, are being reflected in slightly heavier demand for carbon steel plates. The chemical and food processing industries and certain defense programs continue to stimulate the buying of alloys and plate specialties.

The general market picture, however, has not changed materially. Shipyards and the railroads are specifying lightly, and in no one line of consumption does demand appear to be brisk. Producers, though, think the trend is upward. Mill deliveries range ten days to two weeks on sheared and universal mill plates and three to four weeks on alloy material.

Tank volume is more active. Tidewater Oil Co. has closed on six in the Providence, R. I., district. They involve 870 tons of plates. Orders for smaller units for underground storage are increasing. Action still pends on a tank project for the Vernon District, Portland, Oreg., involving 1000 tons of plates. District 79, Seattle, is taking bids on a tank involving 100 tons.

Buying of shipbuilding needs has slowed noticeably. Navy yards have not placed second quarter orders. Naval ships being built at Bethlehem's Fore River yard (Quincy) will be completed by midsummer. At that time, only one new keel will be on the ways, a 102,000 ton tanker. Six keels will be laid in the fall for U. S. Line freighters.

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Navy Yards are placing some substantial head orders for submarines. Lukens Steel Co., Coatesville, Pa., booked two elliptical dished alloy heads for the Portsmouth (N. H.) Yard at $40,636.

Steel Bars . . .

Bar Prices, Page 143

Some mills report order entry on hot rolled carbon bars is a little better than it was. Consumers' requirements continue diversified and reflect the lag in automotive specifications. Deliveries from the mills range two to four weeks, depending on rolling schedules.

Cold drawn bar business is also slightly improved, but converters are still able to ship from stock in many cases, and can give at least ten days' delivery on most grades. Cold drawn alloy shipments are a little more extended than they were.

Revised extra lists on merchant quality and special quality hot rolled carbon bars have been issued. The revisions make it easier for consumers to avoid length extras.

Tubular Goods . . .

Tubular Goods Prices, Page 147

Pipe and tubular goods are moving more actively as spring nears. Construction requirements are expected to expand markedly from here on, and distributors are filling their inventories in anticipation of a seasonal rush of orders.

Inquiry for cast iron pipe is rising as municipalities get ready for their 1961 construction activities.

The number of rotary oil rigs operating in the U. S. and Canada increased by 36 in the latest weekly survey of the Hughes Tool Co. Active rigs in the U. S. totaled 1560, up 31; in Canada there were 182 operating, up 5.

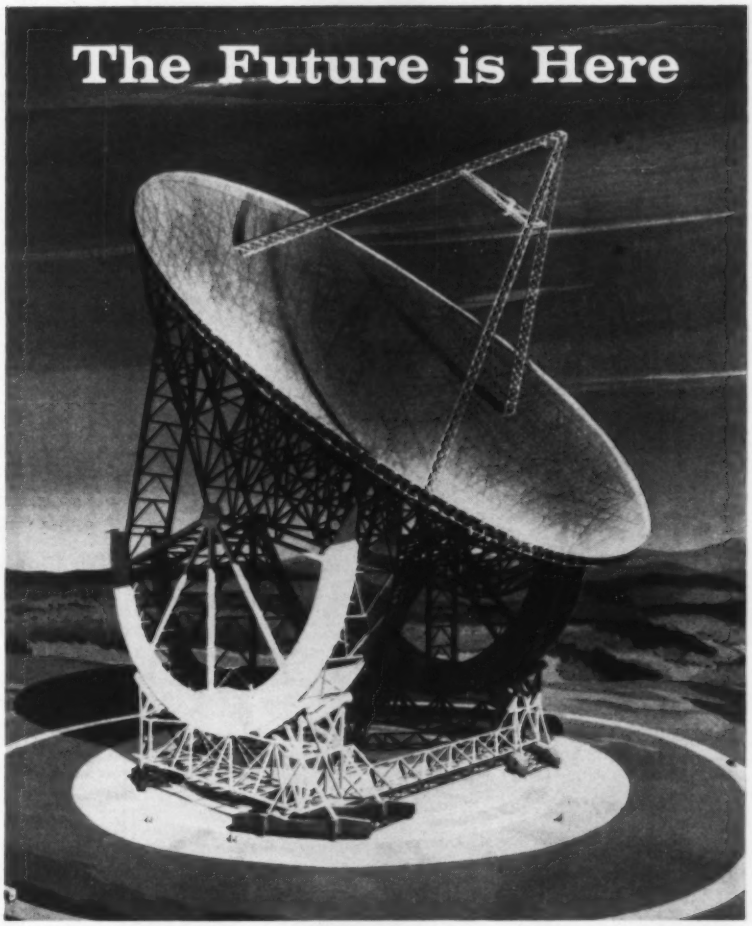
Pacific Gas & Electric Co., San Francisco, is planning a 40 mile, $6 million natural gas line to the Redding area in Northern California.

The Canton Drop Forging & Mfg. Co., Canton, Ohio, has a contract for extruded titanium alloy tubing for the Watertown (Mass.) Arsenal at $404,035.

Distributors . . .

Prices, Page 148

Bookings by steel service centers are running slightly ahead of Feb-



Are you trying to determine what to do about the future? Because of an exceptional combination of advantages a spot in West Virginia was selected as the site of the largest fixed movable object ever built, the U. S. Navy's radio telescope at Sugar Grove, W. Va., tall as a 60-story building.

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ruary's. Structural shapes and sheets are in more active demand than they were.

Inventories remain ample in all categories and can be quickly augmented by prompt mill shipments. The favorable supply situation is an important factor in restricting the improvement in service center business.

A major Houston distributor says the West German increase of 5 per cent in the value of the mark is being watched with considerable concern because other member nations of the European Common Market may decide to follow suit. The West German action is certain to prove costly to U. S. based business, the distributor says.

Steel Shipments Rise 12 Per Cent During January

Finished steel shipments during January totaled 4,637,970 net tons, a 12 per cent increase over the December (1960) movement of 4.1 million tons, reports the American Iron & Steel Institute. In January, 1960, shipments amounted to 8.4 million tons.

Electrolytic tin plate accounted for a large part of the January gain. Totaling 513,675 net tons, shipments of that product more than doubled the 239,978 tons moved during December, and compared with 493,828 tons shipped in January, 1960.

Direct mill shipments for container manufacture also gained sharply, amounting to 617,192 tons vs. 317,122 in December, and 671,640 in January, last year.

Other principal product shipments in January were: Cold rolled sheets, 872,000 tons; hot rolled sheets, 484,997 tons; hot rolled bars (including light shapes), 435,668; plates, 378,480; and heavy structurals, 286, 816.

The major markets during January, other than containers, were: Automotive, 937,331 tons; warehouses, 759,000; construction (including maintenance), 584,237; machinery, industrial equipment and tools, 249,415 tons; contractors' products, 236,616.

Rails, Cars . . .

Track Material Prices, Page 146

The Pennsylvania Railroad plans to spend $7.5 million to rehabilitate

2019 freight cars and repair 6440 others. The project will supplement plans for building 3529 freight cars at a cost of $29 million.

Repairs on diesel locomotives are also being stepped up in anticipation of a traffic increase during the second half.

Workmen are being recalled at the road's shops in Altoona, Pa., and nearby Hollidaysburg to facilitate the car programs.

Pig Iron . . .

Pig Iron Prices, Page 148

Demand for pig iron is dull with foundries buying small tonnages to cover needs. Open hearth operators are also consuming less than normal tonnages of hot metal. Some mills have cut back output of their blast furnaces by fanning.

Hunt-Spiller Mfg. Co., South Boston, Mass., is discontinuing production of industrial castings, but it continues its diesel engine work. A Springfield, Mass., foundry is discontinuing malleable iron casting production.

Meehanite Metal Corp. and International Nickel Co. Inc. have concluded an agreement covering the manufacture of magnesium bearing, spheroidal graphite, cast iron.

Pig iron production (all standard grades) in January totaled 4,039,294 net tons, reports the American Iron & Steel Institute. Output compared with 3,841,159 tons in December, 1960, and 7,753,753 in January, 1960. Of the total, 284,484 were for use in the merchant trade vs. 216,963 in December, 1960, and 448,333 in January, 1960.

Of the total merchant tonnage during January, 42,796 tons were shipped to steel ingot producers and 241,688 tons to other consumers.

Iron ore . . .

Iron Ore Prices, Page 149

U. S. Steel Corp. is reported to have paid about $4.5 million for iron ore deposits near Lovelock, Nev. Engineering studies have been made for construction of a beneficiation plant, but there has been no announcement as to when development of the property will start.

With a Japanese contract for around $7 million worth of iron ore per year, Noranda Mines is preparing to get into the iron ore busi-

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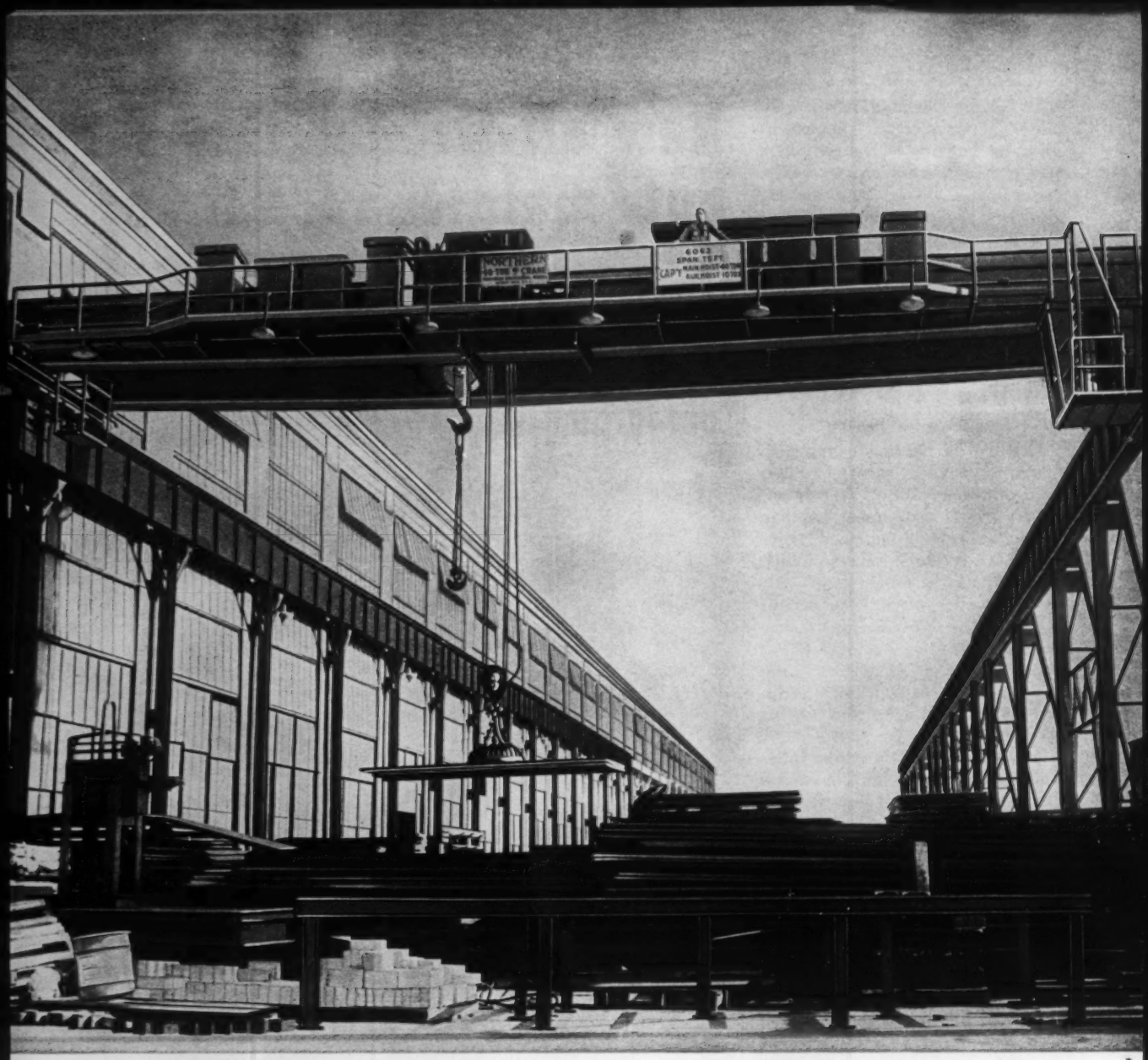

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ness for the first time with its property at Kennedy Lake, 100 miles northwest of Victoria on Vancouver (British Columbia) Island.

Production from the ore body, found barely two years ago, will start early next year. Noranda has a contract to sell 700,000 tons of iron concentrates a year for seven years to a group of Japanese steelmakers.

Oliver Iron Mining Div., U. S. Steel Corp., will not open its Coleraine, Minn., iron ore concentrating plant this year. Originally, the plant had been closed only for the winter and was to have been reopened at the start of the Great Lakes shipping season.

Officials of Oliver indicate declining demand for the quality of ore shipped from the facility, and high stockpiles of ore at mills left over from 1960's shipping season led to the decision to keep the plant closed this year.

Ferroalloys . . .

Ferroalloy Prices, Page 150

Foote Mineral Co., Philadelphia, recently introduced a new grade of electrolytic manganese metal known as Low Hydrogen grade. It's quoted at the same price level as regular No. 1 grade metal. It will typically analyze about 40 parts per million hydrogen, and will be guaranteed to contain less than 50 ppm.

The new grade is designed to meet the needs of stainless steel producers who prefer to keep hydrogen specifications in the finished metal at a minimum. For stringent hydrogen specifications the Hydrogen Reduced grade, with a guaranteed maximum of 7.5 ppm hydrogen, is available. That grade commands a premium of ¾ cent per pound.

The Low Hydrogen grade is not intended to displace regular No. 1 metal.

Steel Production Pace Stepped Up in February

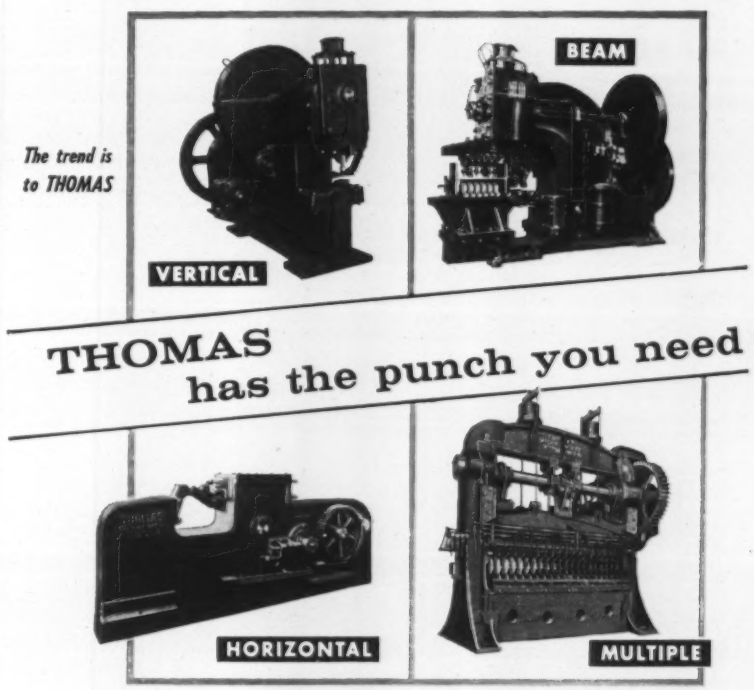
Production of ingots and steel for castings increased on a daily output basis in February, but the total for the month was down from that in January, reports the American Iron & Steel Institute. Both the index of steelmaking and the calculated weekly production increased during the month.

The February total, however, was 6,233,000 net tons, short of the 6,416,004 tons reported for January; the drop resulted from the fewer working days in the period. Based on the index of steelmaking, the

Steel Ingot Production—February, 1961

Period	Open Hearth (Net tons)	Bessemer (Net tons)	Basic Oxygen Process (Net tons)	Electric (b) (Net tons)	Totals (Net tons)	Index (a)
1961						
January*	5,539,900	49,609	213,255	613,240	6,416,004	77.8
February†	5,345,000	68,000	226,000	549,000	6,233,000	83.6
1960						
January	10,510,616	211,132	280,981	1,046,675	12,049,404	146.1
February	9,715,527	216,263	245,458	949,558	11,126,806	144.2
March	10,103,122	202,812	306,741	952,008	11,564,683	140.2
1st Quarter	30,329,265	630,207	833,180	2,948,241	34,740,893	143.4
April	8,603,306	105,336	302,763	766,452	9,777,857	122.5
May	7,844,140	73,010	309,505	603,817	8,830,472	107.0
June	6,441,594	80,344	314,766	568,169	7,404,873	92.7
2nd Quarter	22,889,040	258,690	927,034	1,938,438	26,013,202	107.4
1st Half	53,218,305	888,897	1,760,214	4,886,679	60,754,095	125.4
July	5,494,331	61,700	289,003	505,890	6,350,924	77.0
August	5,860,394	52,652	279,550	645,404	6,838,000	82.9
September	5,525,244	42,228	287,323	603,626	6,458,421	80.9
3rd Quarter	16,879,969	156,580	855,876	1,754,920	19,647,345	80.2
Nine Months	70,098,274	1,045,477	2,616,090	6,641,599	80,401,440	110.3
October	5,917,780	56,914	270,450	623,236	6,868,380	83.3
November	5,308,894	51,246	257,286	554,514	6,171,940	77.3
December	5,042,558	35,559	202,330	559,394	5,839,841	70.8
4th Quarter	16,269,232	143,719	730,066	1,737,144	18,880,161	77.1
2nd Half	33,149,201	300,299	1,585,942	3,492,064	38,527,506	78.7
Totals (1960)	86,367,506	1,189,196	3,346,156	8,378,743	99,281,601	101.9

*Revised.
†Preliminary.
(a) Index based on average production 1957-59 as 100.
(b) Includes crucible steel.
Data from American Iron & Steel Institute.



February output was 83.6 in terms of the basic index of average production during 1957-59. The January index was 77.8. Calculated weekly output during February was 1,558,000 tons vs. 1,448,308 in January.

Tool Steel . . .

Tool Steel Prices, Page 147

Shipments of tool steels (excluding hollow drill steel) in January totaled 6149 net tons, not including 408 tons shipped to members of the industry for further conversion, reports the American Iron & Steel Institute. That compares with 5697 tons in December, and with 9577 tons in January, 1960.

Steelmaking Operations Continue Gradual Decline

Steel ingot operations have declined for three consecutive weeks, but the drop in tonnage is only 0.7 per cent for the period. STEEL estimates output for the week ended Mar. 18 at 1,570,000 tons compared with 1,582,000 for the week ended Feb. 25, the high since June, 1960.

Production in most districts, including Northeastern, Chicago, St. Louis, and Western, is expected to hold steady at least through March with only minor weekly variations. The order picture for steel is brighter, however.

● **Birmingham** — STEEL estimates output here for the week ended Mar. 18 at 56.5 per cent of the 1960 capacity figure. That represents a drop of 4½ points.

● **Youngstown**—Steel ingot production rose 1 point here during the week ended Mar. 18. Republic Steel Corp. relighted one open hearth furnace as a result of improving order volume. Closing of the Campbell Works of Youngstown Sheet & Tube Co. for construction work on rolling mills kept the district operating rate from showing a greater gain. Shutdown of the firm's Brier Hill Works, also for construction work, will follow.

● **Pittsburgh**—STEEL estimates a 1 point drop in ingot output here for the week ended Mar. 18. Increased activity at some mills was more than offset by lower activity at others.

● **Cincinnati** — Ingot production rose slightly during the week ended Mar. 18 with the gain in tonnage amounting to about 1025 tons. A large mill added an open hearth to its production schedule, but maintenance work on an area mill's furnace was an offsetting factor. Mill spokesmen said orders are increasing with larger customers showing improved buying interest.

● **Detroit**—Steel ingot production is holding at the equivalent of about 50 per cent of 1960 capacity, although the rating may drop a point or two as mills schedule some normal repairwork. A slight pickup in dealer orders for automobiles is encouraging local millmen. They foresee small tonnage increases for April.

● **Buffalo**—STEEL forecasts a leveling off of production here during the week ended Mar. 18, following a surprising drop during the preceding week. Republic Steel Corp. shut down an open hearth and is now operating only one of its nine furnaces. Bethlehem Steel Co. also reduced operations and is using only 10 or 11 of its 35 open hearths. Weakness in automotive demand was cited as the primary reason for the decline in operations. The trade hopes for a pickup in orders in April, but the immediate outlook is bleak.

There is a growing feeling here that when the turnabout arrives in the local steel industry it may be a fairly rapid one. The reason for this is that inventories of many consumers have hit rock bottom and have been allowed to stay there.

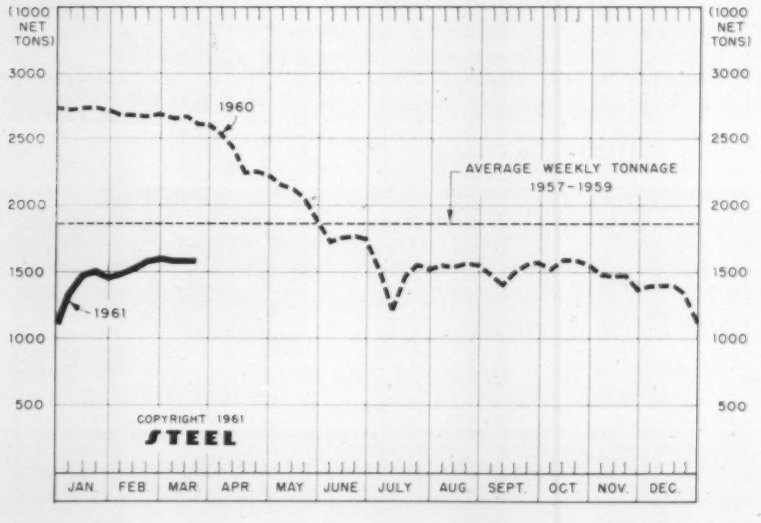
● **Cleveland**—Steel ingot production held fairly steady during the week ended Mar. 18. The trend, however, has been slightly downward since the week ended Feb. 11 when the high for the year to date was reached at 72,224 tons. Production now is under 65,000 tons.

STEEL INGOT PRODUCTION

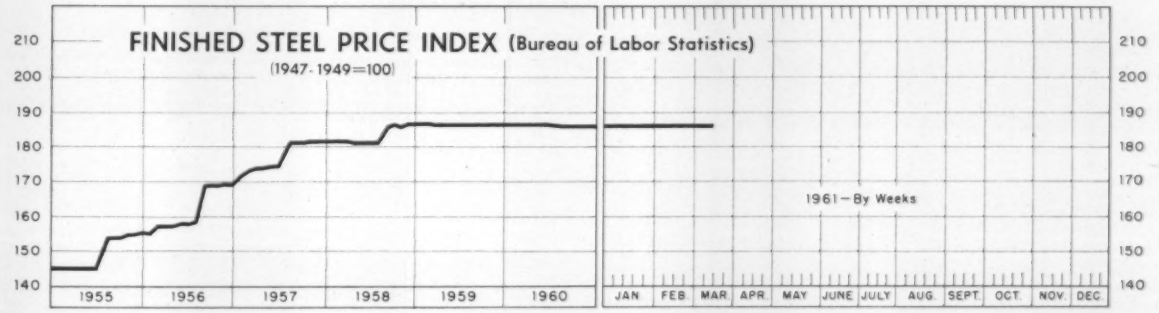
Weeks Ended	Net Tons	Change
Mar. 18	1,570,000*	— 0.2%
Mar. 11	1,573,000	— 0.4%
Mar. 4	1,580,000	— 0.1%
Totals to Mar. 11		
1961	15,141,000	—43.8%
1960	26,919,000	

DISTRICTS	Week Ended Mar. 11 Tons‡	Week Ended Mar. 11 Index†	Week Ended Mar. 4 Index†
Northeastern	232,461	87	88
Buffalo	69,122	71	77
Pittsburgh	318,804	79	79
Youngstown	105,388	62	69
Cleveland	64,817	70	71
Detroit	94,425	90	86
Chicago	347,891	93	92
Cincinnati	64,848	86	84
St. Louis	53,601	102	108
Southern	98,640	91	88
Western	120,420	103	100
Industry	1,573,000	84.4	84.8

*Estimated by STEEL. †1957-59=100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Mar. 14, 1961	Week Ago	Month Ago	Feb. Index	Year Ago
186.2	186.2	186.2	186.2	186.8

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 14

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825	Bars, H.R., Carbon	6.675
Rails, Light, 40 lb	7.292	Bars, Reinforcing	6.335
Tie Plates	6.875	Bars, C.F., Carbon	10.710
Axles, Railway	10.175	Bars, C.F., Alloy	14.125
Wheels, Freight Car, 33 in. (per wheel)	62.000	Bars, C.F., Stainless, 302 (lb)	0.570
Plates, Carbon	6.350	Sheets, H.R., Carbon	6.350
Structural Shapes	6.167	Sheets, C.R., Carbon	7.300
Bars, Tool Steel, Carbon (lb)	0.560	Sheets, Galvanized	8.775
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680	Sheets, C.R., Stainless, 302 (lb)	0.658
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400	Sheets, Electrical	12.625
Bars, Tool Steel, H.R. Alloys, High Speed, W18 Cr 4, V 1 (lb)	1.895	Strip, C.R., Carbon	9.489
Bars, H.R., Alloy	10.775	Strip, C.R., Stainless, 430 (lb)	0.480
Bars, H.R., Stainless, 303 (lb)	0.543	Strip, H.R., Carbon	6.250
		Pipe, Black, Buttweld (100 ft)	19.495
		Pipe, Galv., Buttweld (100 ft)	23.098
		Pipe, Line (100 ft)	195.430
		Casing, Oil Well, Carbon (100 ft)	201.080
		Casing, Oil Well, Alloy (100 ft)	$15.213
		Tubes, Boiler (100 ft)	51.200
		Tubing, Mechanical, Carbon (100 ft)	27.005
		Tubing, Mechanical, Stainless, 304 (100 ft)	194.268
		Tin plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
		Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
		Black Plate, Canmaking Quality (95 lb base box)	7.900
		Wire, Drawn, Carbon	10.575
		Wire, Drawn, Stainless, 430 (lb)	0.665
		Bale Ties (Bundles)	7.647
		Nails, Wire, 8d Common	9.433
		Wire, Barbed (80-rod spool)	8.373
		Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Mar. 15 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg=100)	247.82	247.82	247.82	247.82	209.10
Index in cents per lb	6.713	6.713	6.713	6.713	5.665

STEEL's ARITHMETICAL PRICE COMPOSITES

	Mar. 15 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$128.02
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	58.99
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	58.49
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	59.77
Steelmaking Scrap, GT	37.67	36.67	33.67	34.00	49.17

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Mar. 15 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	4.65
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	4.65
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.25
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	4.60
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	4.60
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.50
Plates, Chicago	5.30	5.30	5.30	5.30	4.50
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	4.80
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.50
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	4.80
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.325
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.325-5.425
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	5.85
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.325
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.325
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.25
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.25-6.35
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.35
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	6.60
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	7.60
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.45

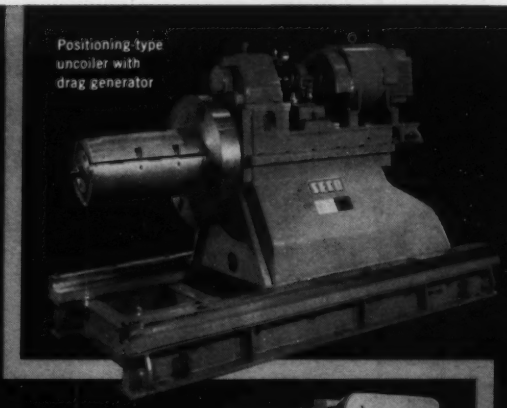
SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$84.50
Wire rods, ⅜-⅝" Pitts.	6.40	6.40	6.40	6.40	5.375

PIG IRON, Gross Ton	Mar. 15 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$59.50
Basic, Valley	66.00	66.00	66.00	66.00	58.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.07	62.16
No. 2 Fdry, NevilleIsland, Pa.	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	59.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.57	62.66
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	55.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	62.70
Malleable, Valley	66.50	66.50	66.50	66.50	59.00
Malleable, Chicago	66.50	66.50	66.50	66.50	59.00
Ferromanganese, net tons†	245.00	245.00	245.00	245.00	205.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$34.50	$34.50	$31.50	$34.50	$48.50
No. 1 Heavy Melt, E. Pa.	42.00	39.00	39.00	38.00	50.00
No. 1 Heavy Melt, Chicago	36.50	36.50	30.50	31.50	49.00
No. 1 Heavy Melt, Valley	36.50	36.50	32.50	36.50	52.50
No. 1 Heavy Melt, Cleve.	33.50	33.50	29.50	33.50	50.50
No. 1 Heavy Melt, Buffalo	29.50	29.50	27.50	31.50	47.50
Rails, Rerolling, Chicago	58.50	57.50	54.50	53.50	66.50
No. 1 Cast, Chicago	42.50	42.50	41.50	45.50	48.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.125
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	16.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	27.50



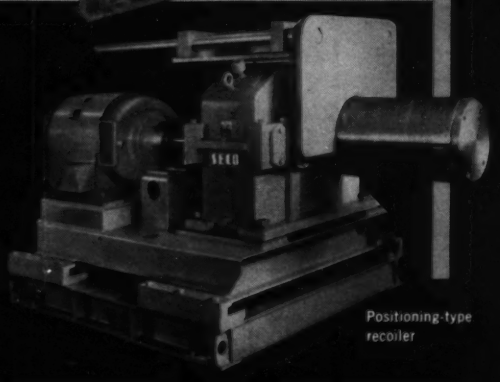
Positioning-type uncoiler with drag generator

Predictable Performance

for processing lines with

SECO

terminal equipment



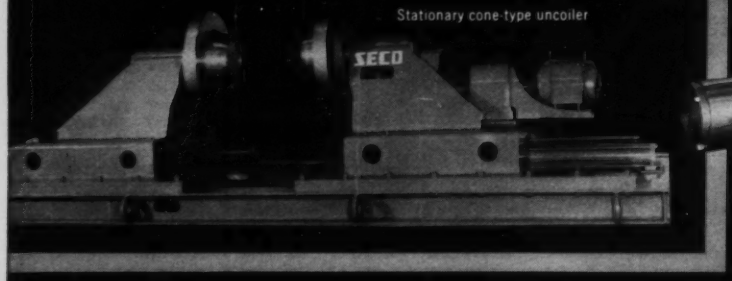
Positioning-type recoiler

From entry to exit, new and modernized processing lines . . . annealing, pickling and others . . . perform better with SECO terminal equipment. This equipment handles coils ranging from 10,000 to 50,000 pounds with speed, convenience, safety.

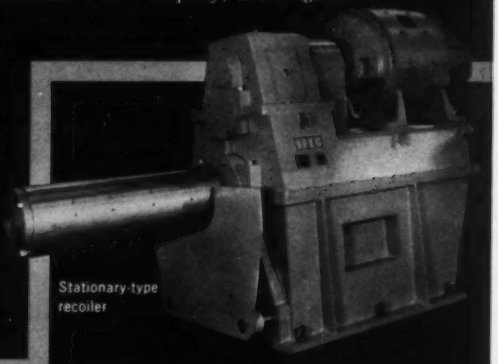
SECO uncoilers and recoilers are designed to operate at any speed the mill requires, are available in positioning or stationary types. The positioning types feature a slideable reel base mounted on a sub-base for alignment with the processing line, actuated by an automatic edge control.

SECO also makes auxiliary equipment such as coil cars with coil lifts to simplify uncoiler loading and recoiler unloading. Available for mandrel or cone-type reels.

A staff of trained sales engineers will assist you in finding the equipment best suited to your needs. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles.



Stationary cone-type uncoiler



Stationary-type recoiler

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

Affiliated with Lee Wilson Engineering Co., Inc.

Steel Prices

Mill prices as reported to STEEL, Mar. 15, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 144; footnotes, page 146.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall, Pa. U5 ....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 ....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rerolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2 ..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5 ..80.00
S.Duquesne,Pa. U5 ....80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 .104.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Fontana,Calif. K1 ...109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 ....99.50
Houston S5 .....104.50
Johnstown, Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 ....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14 .99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ....109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

BethlehemPa. B2 ...$119.00
Bridgeport,Conn. C32 .119.00
Buffalo R2 .....119.00
Canton,O. R2, T7 ....119.00
Conshohocken,Pa. A3 .126.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2. .119.00
LosAngles B3 .....139.00
Lowellville,O. S3 .....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18.....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14 .119.00
S.Duquesne,Pa. U5 ....119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14 .122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ....5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. U5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 .....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala, T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 .....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14 .5.50
S.SanFrancisco B3 .....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 .....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 .....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N15 .....5.50
Weirton,Wa.Va. W6 ....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14..6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1..8.05
Johnstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ..8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 .....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.06

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ..8.10
Munhall,Pa. U5 .....8.06
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ..5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ..6.50
Weirton,W.Va. W6 .....6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ...5.30
Aliquippa,Pa. J5 .....5.30
Ashland,Ky.(15) A10 ...5.30
Atlanta A11 .....5.50
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ..5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 .....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ..5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B3 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 .....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ..7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.95
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1.7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Aliquippa,Pa. J5 .....7.50
Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 .....7.50
Johnston,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 .....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

PLATES, Ingot Iron

Ashland c.l.(15) A10 ...5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R2 .....6.05
Warren,O. R2 .....6.05

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ....5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless.Pa.(9) U5 ....5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 .....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ...6.025
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Owensboro,Ky.(9) G8 ...6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 .....6.425
Riverdale,Ill.(9) A1 ..5.675
Seattle(9) A24,B3,N15 .6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ....5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ..5.675
Torrance,Calif.(9) C11 .6.375
Warren,O. C17 .....6.025
Youngstown(9) R2,U5..5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ...6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 .....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif. K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 .....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14.6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 ....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.05
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ..6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14 .....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon

LosAngeles P2, S30 ...11.75*

Alloy

Ambridge,Pa. W18 ...10.175
BeaverFalls,Pa. M12 ..10.175
Camden,N.J. P13 .....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 .....10.175
Newark,N.J. W18 .....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2.7.65
Birmingham C15 .....8.25
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, P17 .....7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 .....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ....8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ....9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.65
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 .....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Gronud)

Cumberland,Md.(5) C19.6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 .....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 .....9.025
Detroit B5, P17 .....9.225
Detroit S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 .....9.025
Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ....9.325
Massillon,O. R2, R8 ..9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
Plymouth,Mich. P5 .....9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20

Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan, Ill. A7 ....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

AlabamaCity,Ala. R2 ..5.675
Atlanta A11 .....5.25
Birmingham C15 .....5.25
Buffalo R2 .....5.675
Cleveland R2 .....5.675
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ..6.425
Fairfield,Ala. T2 .....5.675
Fairless,Pa. U5 .....5.825
Fontana,Calif. K1 .....6.375
Ft. Worth,Tex.(26) T4 ..5.50
Gary,Ind. U5 .....5.675
Houston S5 .....5.675
Ind.Harbor,Ind. I-2, Y1.5.675
Johnstown,Pa. B2 .....5.675
Joliet,Ill. P22 .....5.675
KansasCity,Mo. S5 ....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.875
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburg,Calif. C11 ..6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ...6.425
SandSprings,Okla. S5 ..5.675
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. R2, W14.5.675
S.Duquesne,Pa. U5 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10
Torrance,Calif. C11 ..6.375
Youngstown R2, U5 ..5.675

BARS, Reinforcing, Billet (Fabricated: to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Houston S5 .....7.35
Johnstown,Pa. B2 .....7.33
KansasCity,Mo. S5, ...7.35
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 .....7.35

SandSprings,Okla, S5 ...7.35
Seattle A24, B3, N14 ..7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17
Williamsport,Pa. S19 ..7.25

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 15.10
Economy,Pa.(D.R.)B14 19.30
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 19.80
McK.Rks.(S.R.) L5 ...14.50
McK.Rks.(D.R) L5 ..19.80
McK.Rks.(Staybolt)L5 .20.95

BARS, Rail Steel

ChicagoHts.(3) C2, I-2.5.575
ChicagoHts.(4) (44) I-2.5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ....5.575
Franklin,Pa.(4)F5 ....5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 .....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ..5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ..5.15
Detroit(8) M1 .....5.10
Ecorse,Mich G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1.5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ..5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 .....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparrowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 ....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 ....8.25
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14.7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ....7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ...5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 .....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ..7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 ....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.225	....
Ashland,Ky. A10	7.225	7.475
Canton,O. R2	7.225	....
Fairfield,Ala. T2	7.225	7.475
Gary,Ind. U5	7.225	7.475
GraniteCity,Ill.G4	7.325	....
Ind.Harbor I-2	7.225	7.475
Irwin,Pa. U5	7.225	7.475
Kokomo,Ind. C16	7.325	....
MartinsFry. W10	7.225	7.475
Pitts.,Calif. C11	7.975	....
Pittsburgh J5	7.225	....
SparowsPt. B2	7.225	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ...7.475

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 .7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) ..9.525

SHEETS, Wall Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low-Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

Sheets, Galvannealed Steel

Canton,O. R2 .....7.275
Irvin,Pa. U5 .....7.275

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Cleveland(28) R2 .....7.65
Niles,O.(28) R2 .....7.65
Weirton,W.Va. W6 ....7.50

SHEETS, Galvanized Steel Hot-Dipped

AlabamaCity,Ala. R2..6.875‡
Ashland,Ky. A10 ....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 ....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.Harbor,Ind. I-2 ..6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10..6.875*
Middletown,O. A10 ..6.875†
Pittsburg,Calif. C11 ..7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,Wa.Va. W6 ..6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A24 Alaska Steel Mills Inc.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calument Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National-Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N20 Neville Ferro Alloy Co.

O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P24 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Products & Chemical Corp.
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan-Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 ....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1..5.10
Johnstown,Pa.(25) B2..5.10
Lackaw'na,N.Y.(25) B2..5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3 ..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5 .....5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell,Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ....8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 .....7.575
Bessemer,Ala. T2 .....7.575
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2, Y1 7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ....8.325
Seattle(25) B3 .....8.575
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3 8.325
SparrowsPoint,Md. B2 ..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ....7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7, J5 ....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.525
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10 .7.425
Fontana,Calif. K1 ....9.20
FranklinPark,Ill. T6 ..7.525
Ind.Harbor,Ind. Y1 ....7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ..7.525
NewBedford,Mass. R10..7.875
NewBritain,Conn. S15 ..7.875
NewCastle,Pa. B4, M23 7.425
NewHaven,Conn. D2 ...7.875
NewKensington,Pa. A6 7.425
Pawtucket,R.I. R3, N8 7.975
Philadelphia P24 .....7.875
Pittsburgh J5 .....7.425
Riverdale,Ill. A1 .....7.525
Rome,N.Y. (32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J. (31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Cleveland A7 .....15.55
Carnegie,Pa. S18 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 ....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ....15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ....10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ....10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, Cold-Finished	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Spring Steel (Annealed)					
Anderson,Ind. G6	9.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

STRIP, C.R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ....7.525*
McKeesport,Pa. E10 ...7.50*
NewCastle,Pa. M23 ..7.425*
Riverdale,Ill. A1 .....7.525*
Warren,O. B9, S3, T5 .7.425*
Worcester,Mass. A7 ....7.975
Youngstown S41, Y1 .7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

TIN MILL PRODUCTS

TIN PLATE, Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$9.10	$9.35	$9.75
Fairfield,Ala. T2	9.20	9.45	9.85
Fairless,Pa. U5	9.20	9.45	9.85
Fontana,Calif. K1	9.75	10.00	10.40
Gary,Ind. U5	9.10	9.35	9.75
GraniteCity,Ill. G4	9.20	9.45	9.85
IndianaHarbor,Ind. I-2, Y1	9.10	9.35	9.75
Irvin,Pa. U5	9.10	9.35	9.75
Niles,O. R2	9.10	9.35	9.75
Pittsburg,Calif. C11	9.75	10.00	10.40
SparrowsPoint,Md. B2	9.10	9.35	9.75
Weirton,W.Va. W6	9.10	9.35	9.75
Yorkville,O. W10	9.10	9.35	9.75

ELECTROLYTIC TIN-COATED SHEET (Dollars per 100 lb)			
Aliquippa,Pa. J5 (21-27 Ga.)	7.90	8.10	....
IndianaHarbor,Ind. Y1 (20-27 Ga.)	7.90	....	....
Niles,O. R2 (20-27 Ga.)	7.90	8.10	8.30

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Base Box			
	45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.20	$6.35	$6.50	$6.65
Fairless,Pa. U5	6.20	6.35	6.50	6.65
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irvin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Hot Dipped Common Coke	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$10.40	$10.65
Fairfield,Ala. T2	10.50	10.75
Fontana,Calif. K1	11.05	11.30
Gary,Ind. U5	10.40	10.65
Irvin,Pa. U5	10.40	10.65
Pitts.,Calif. C11	11.06	11.30
Sp.Pt.,Md. B2	10.40	10.65
Weirton,W.Va. W6	10.40	10.65
Yorkville,O. W10	10.40	10.65

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.30
Fairless,Pa. U5 .....8.30
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 .....8.30
Ind.Harbor,Ind. I-2, Y1..8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 ....8.20
Yorkville,O. W10 .....8.20

HOLLOWARE ENAMELING (Black Plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 .....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	....	11.70†	12.40	13.55	14.65
					Stator
Mansfield,O. E6					8.10
Vandergrift,Pa. U5					8.10
Warren,O. R2 (Locore)					8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. ‡Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. MS. 8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 ....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 ....8.25
Monessen,Pa. P7, P16..8.00
Palmer,Mass. W12 ....8.30
Pittsburg,Calif. C11 ...8.95
Portsmouth,O. P12 ....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2..8.10
Sterling,Ill.(1) N15 ....8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 ....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 12.65
KansasCity,Mo. U3 ...12.90
LosAngeles(2) B3 ....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16..12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ...12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ...13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10) B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ....12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3..10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ...10.05
Palmer,Mass. W12 ....10.06
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Worcester,Mass. A7 ....10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 ....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.70
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ...10.70
Portsmouth,O. P12 ....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.70
SparrowsPt.,Md. B2 ...9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 ....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. MS.16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ..16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 ....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 ....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7, J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S1 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 ....13.75
Portsmouth,O. P12 ....13.45
Roebling,N.J. R5 .....13.75
St.Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ....13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville,Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, CUT (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler
(14½ Ga.) (per 97 lb Net Box)
Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	10.51
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	10.51
Kokomo,Ind. C16	8.88
LosAngeles B3	9.44
Minnequa,Colo. C10	9.02
Pittsburg,Calif. C11	9.44
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.94
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand.

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	10.85
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	10.85
Kokomo,Ind. C16	9.16
LosAngeles B3	9.75
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.75
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	10.26
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	10.90
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	10.96
Kokomo,Ind. C16	9.21
LosAngeles B3	9.80
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.80
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	10.31
SparrowsPt.,Md. B2	9.21
Sterling,Ill.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPt,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)

	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Ali'ppa,Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	
Cleveland A7	17.85	
Craw'sville M8	17.95	19.80††
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	18.95	19.80††
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	18.15	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	

WOVEN FENCE, 9-15 Ga. Col.

Ala.City,Ala. R2	187**
Aliq'ppa,Pa.9-11½ga.J5	190§
Atlanta A11	191*
Bartonville,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Duluth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A1	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality

	An'ld Galv.
Ala.City,Ala. R2	9.00 9.55**
Aliquippa J5	8.65 9.325§
Atlanta (48) A11	9.00 9.75*
Bartonville(48)K4	9.85 19.90
Buffalo W12	9.00 9.55†
Chicago W13	9.00 9.55**
Cleveland A7	9.00
Crawfordsville M8	9.10 9.80††
Donora,Pa. A7	9.00 9.55†
Duluth A7	9.00 9.55†
Fairfield T2	9.00 9.55†
Houston(48) S5	9.25 9.80**
Jack'ville,Fla. M8	9.10 9.80‡‡
Johnstown(48) B2	9.00 9.675§
Joliet,Ill. A7	9.00 9.55†
KansasCity(48)S5	9.25 9.80**
Kokomo(48) S16	9.10 9.65†
LosAngeles B3	9.95 10.625§
Minnequa C10	9.25 9.80**
Monessen(48) P7	8.65 9.35§
Palmer,Mass. W12	9.30 9.85†
Pitts.,Calif. C11	9.95 10.50†
Rankin,Pa. A7	9.00 9.55†
S.Chicago R2	9.00 9.55**
S.SanFran. C10	9.95 10.50**
Spar'wsPt.(48)B2	9.10 9.775§
St'ling(37)(48)N15	9.10 9.80
Struthers,O. Y1	9.00 9.65†
Worcester,Mass.A7	9.30 9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.00c. **Subject to zinc equalization extras.

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in., larger 12.85
7/16 in. and smaller by 6 in. and shorter: 15% off list.

FASTENERS

(Consumer discounts per cent off list prices, orders for 1 container for assorted sizes; for less than container quantities, add 25 per cent; attaching nuts to bolts, package sizes, add 7.5 per cent; heavy hex nuts 1¼ in. through 1½ in. tapped 8 threads, add 10 per cent)

HEX HEAD CAP SCREWS, coarse, or fine thread, packaged or bulk, with or without hex nuts, 1020 steel bright and high carbon heat treated, ¼ in. thru 1 in. diam., listed lengths:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

BOLTS, Standard stock sizes:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
*Bulk	50

*Hot galvanized or zinc plated lag bolts only — for package or bulk quantities use applicable list less bulk discounts.

CAP AND SETSCREWS,

Fillister Head, Cap Screws, Coarse Thread:

Packaged	+55
Bulk	+16

Flat Head Cap Screws:
¾ in. and smaller, 6 in. and shorter:

Packaged	+85
Bulk	+38

Setscrews, Square Head, Cup Point, Coarse Thread:

Through 1 in. diam., 6 in. and shorter:	
Packaged	+ 5
Bulk	19
Through 1 in. diam., longer than 6 in.:	
Packaged	+29

HEXAGON NUTS: American Standard: Finished hex, hex jam, and hex slotted coarse or fine fine thread, ¼ in. through 3 in., finished hex thick, thick and slotted, castle, fine thread, ¼ in. through 1½ in., semifinished hex heavy, heavy and jam, heavy and slotted, coarse thread, ¼ in. through 4 in., and

SQUARE NUTS, American Standard: Regular square and heavy square, coarse thread, ¼ in. through 2 in.:

Plain Finish	50
Hot Galvanized and Zinc Plated:	
Packaged	43.75
Bulk	50

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over)

	Standard Diameter, Inches				
	7/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St. Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.13
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2¼	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	Standard All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.225
Steelton,Pa. B2	5.75	5.65	....	....
Williamsport,Pa. S19	....	....	....	6.725

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsburgh S44	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago,Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

Footnotes

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1¼ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in.; 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(26) Deld. in mill zone, 5.65c.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.; 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(34) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38) 13 Ga. & lighter; 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.65c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	1.5	+27	+10.5	+36	+21	+45.5	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	H.R. Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	....	43.50	39.25	48.50	45.00
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	49.25
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	47.50
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	52.00
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	45.75	52.00	52.00
304L	....	37.25	47.25	48.25	52.00	54.50	53.50	59.75	59.75
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	80.50	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	80.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	88.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	65.50
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 CbTa	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	79.25
403	....	....	29.25	....	33.25	35.00	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	29.25	31.00	33.25	35.00	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	40.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	51.75
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Ellwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steel Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Steel Corp.; Vanadium-Alloys Steel Co.; Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates—Carbon Base 5%	10%	15%	20%	Sheets—Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	....	T-1	1.840
18	4	2	....	....	T-2	2.005
13.5	4	3	....	....	T-3	2.105
18.25	4.25	1	4.75	....	T-4	2.545
18	4	2	9	....	T-5	2.915
20.25	4.25	1.6	12.95	....	T-6	4.330
13.75	3.75	2	5	....	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C12, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
N. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
New York, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y., R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P8	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....

Other U. S. Districts	Basic	No. 2 Foundry	Malleable	Bessemer
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS PIG IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Erie, Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb items (except stainless) ordered by themselves. Prices will vary with total weight of the order or weight of the individual items or both. Base quantities for stainless sheets: 8000 lb, except in Chicago, New York, Boston, Los Angeles, and San Francisco, 10,000 lb. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS				STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Stainless Type 302	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.83	....	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	7.77	9.61	10.06	....	10.18	8.55	11.70	16.38	9.03	8.34	10.02
Birmingham	9.43	10.20	10.46	....	10.41	8.26	13.14	16.76	8.47	8.41	10.06
Boston	9.67	10.58	11.77	53.50	12.16	9.77	13.35	16.59	10.16	9.62	11.08
Buffalo	8.55	9.30	11.25	55.96	11.00	8.75	11.45	16.30	9.15	8.65	11.10
Charlotte, N. C.	10.52	11.22	10.55	....	11.51	10.32	12.68	....	10.53	10.47	12.11
Chicago	8.57	10.20	10.15	52.00	10.74	8.55	10.65	15.95	8.91	8.41	10.68
Cincinnati	9.34	10.26	10.75	65.30	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	8.57	9.98	10.92	56.18	10.86	8.66	11.25	16.06	9.30	8.65	10.92
Dallas	9.62	10.05	11.75	....	10.57	9.03	12.98	16.95	9.26	9.35	11.97
Detroit	9.48	10.46	11.06	52.00	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	....	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	9.22	9.65	11.35	52.00	11.73	9.58	13.10	16.55	9.81	9.41	10.60
Indianapolis	9.66	10.64	11.14	....	11.83	9.66	11.09	16.39	10.01	9.50	11.79
Kansas City	9.21	10.87	11.35	....	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.20	61.27	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	8.98	10.05	....	....	10.64	8.82	12.74	....	9.01	8.66	11.41
Milwaukee	8.71	10.34	10.29	....	10.88	8.69	10.89	16.09	9.13	8.55	10.82
Moline, Ill.	8.92	10.55	10.50	....	11.09	8.90	11.00	16.30	9.26	8.76	11.03
Newark, N. J.	9.36	10.13	11.35	....	11.46	9.74	13.25	16.40	10.20	9.51	11.06
New York	9.36	10.13	11.35	52.96	11.46	9.74	13.25	16.40	10.20	9.51	11.00
Philadelphia	9.80	9.60	10.66	52.71	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	8.57	9.98	11.13	52.00	10.84	8.55	11.25	15.95	8.91	8.41	10.63
Portland, Oreg.	9.45	11.30	12.35	....	11.45	9.45	16.65	17.80	10.06	9.60	11.75
St. Louis	8.77	10.53	11.08	....	10.94	8.77	11.28	16.33	9.14	8.77	10.91
St. Paul	9.57	10.24	11.39	....	11.74	9.57	11.49	16.54	9.92	9.41	10.96
San Francisco	10.17	11.69	11.40	54.00	11.78	10.07	15.10	17.25	10.49	10.38	12.47
Seattle	11.35	12.45	13.40	54.02	12.88	10.80	16.20	17.80	11.50	10.95	13.16
Spokane, Wash.	11.20	12.30	13.25	54.02	12.65	10.65	16.20	17.85	11.35	10.80	13.01

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; stainless, 16 Ga. & 36 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1¾ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plates, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., $140; Salina, Pa., $145; Niles, Ohio, $146; Cutler, Utah, $175.

Super-Duty: Ironton, Ohio, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Md., St. Louis, $185; Stevens Pottery, Ga., $195; Cutler, Utah, $248.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Pt. Matilda, Pa., Portsmouth, Ohio, Hawstone, Pa., St. Louis, $158; Warren, Niles, Windham, Ohio, Hays, Latrobe, Morrisville, Pa., $163; E. Chicago, Ind., Joliet, Rockdale, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Super-Duty: Sproul, Hawstone, Pa., Niles, Warren, Windham, Ohio, Leslie, Md., Athens, Tex., $158; Morrisville, Hays, Latrobe, Pa., $163; E. Chicago, Ind., St. Louis, $168; Canon City, Colo., $183; Curtner, Calif., $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $140; Philadelphia, Clearfield, Pa., $145.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Vandalia, Mo., New Salisbury, Ohio, $97; Vanport, Pa., Wellsville, Irondale, Ohio, $100; Clearfield, Pa., Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., Danville, Ill., $250; Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., $260.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., $320; Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., $360; Philadelphia, $365.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Bonne Terre, Mo., $15.00.

Magnesite (per net ton)

Domestic, dead-burned, ⅛ in. grains with fines: Chewelah, Wash., Luning, Nev., $46; ⅜ in. grains with fines: Baltimore (periclase), $73; Pascagoula, Miss. (periclase), $90.

*—9 in. x 4½ x 2.50 straights.

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:
Carbon (N.T.):
Forging $97.00
Rerolling 78.00
Alloy (N.T.) 115.00

Wire Rods:
Carbon 5.70
Alloy 6.40

Wire (carload lots):
Merchant annealed . 8.40
Low carbon indus. . 7.20
Upholstery spring .. 8.55
M.B. spring 8.85

Bars & Small Shapes:
Carbon, merchant .. 5.30
Carbon, special 5.85
Alloy 6.40

Bar Mill Bands:
Carbon 5.40
Alloy 8.05

Bars, Reinforcing 5.30

Structural Shapes:
Standard carbon ... 5.50
Angles & zees 5.40

Plates, Carbon:
Sheared 5.45
Universal mill 5.10

Sheets & Coils, Hot Rolled:
Carbon sheet 4.95
Carbon strip 5.00

Sheets & Coils, Cold Rolled:
Carbon sheet 6.35
Carbon strip:
(0.030 and lighter) 6.35
(0.031 and heavier) 6.65

Sheets & Coils, Galvanized:
Standard quality ... 6.70
Culvert quality 7.00

Sheets, Porcelain Enameling 7.45

Sheets & Coils, Electrical:
Field grade 9.00
Armature grade 9.50
Electrical grade 10.15

Sheet Piling 6.15

Skelp 4.70

Rails, Heavy 5.55

Rails, Light 5.70

Joint Bars 6.55

Tie Plates 6.35

Grinding Balls (3 in. diam.) 7.00

Tin Mill Products (Per base box; 100 lb base wt)
Coke tin plate (1.25 lb pot yield) $10.60
Electrolytic tin plate (0.25 lb coating). 9.10
Black plate 8.30

Nails, Wholesale:
Carload lots ..... Col. 110

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $28-$28.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh, bags	8.10††
Electrolytic Iron,	
Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	28.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe.	36.75, ton, del. east of Mississippi.
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh) ..	58.0
Carbonyl Iron:	
90-99.9%, 3 to 20 microns, depending on grade. 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum:	
Atomized, 600-lb drum freight allowed, c.l. 39.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	36.50
Bronze powder, 90/10.	54.20
Copper, all types	15.25*
Lead	7.50*
Manganese, minus 35 mesh	1.00
Nickel, all types ..	0.78-1.06
Nickel-Silver	57.90
Solder	7.50*
Stainless Steel, 304 ...	89.00
Stainless Steel, 316 ...	$1.07
Steel, AISI 4650	32.00
Tin	14.00*
Zinc	23.20

	Dollars
Cobalt:	
98.5%, minus 100-300 mesh ..	1.57-1.58
99.5%, below 5 microns	2.32
Tungsten	nom.
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	*$5.80*	*$6.05*	*$5.75*	*$5.65*	*$5.95*
Bar Size Angles	5.85	6.10	5.80	5.70	6.00
Structural Angles	*5.75*	*6.00*	*5.70*	*5.60*	*5.90*
I-Beams	*5.70*	*5.95*	*5.65*	*5.55*	*5.85*
Channels	*5.70*	*5.95*	*5.65*	*5.55*	*5.85*
Plates (basic bessemer)	5.45	5.80	5.50	5.40	5.70
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	25.20	24.70	24.40	24.40	25.20
Barbed Wire (†)	*6.35*	*6.25*	*6.25*	*6.10*	*6.45*
Merchant Bars	5.85	6.10	5.80	5.70	6.00
Hot-Rolled Bands	5.95	6.20	5.90	5.80	6.10
Wire Rods, Thomas Commercial No. 5	5.80	5.85	5.75	5.75	6.00
Wire Rods, O.H., No. 5	6.00	6.05	5.95	5.95	6.25
Bright Common Wire Nails (§)	*6.80*	*7.05*	*6.75*	*6.65*	*6.95*

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier.

Ores

Lake Superior Iron Ore

(Prices effective for the 1960 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi bessemer $11.60
Lump ⅛ in. and up 12.55
Fines, under ⅛ in. 10.72
Mesabi nonbessemer 11.45
Old Range bessemer 11.85
Old Range nonbessemer 11.70
Open-hearth lump 12.70
High phos. 11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1960; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports 25.00†
Chilean, 62-65%, c.i.f. Atlantic ports ... 22.00
Brazilian, 68.5% f.o.b. vessel, Victoria, per ton $11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality *$16.00-16.50**
Domestic, concentrates, f.o.b. milling points 22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian

48% 3:1 ..... $34.00-35.00†
48% no ratio ..... 25.00-26.00†

South African Transvaal

44% no ratio 18.75
48% no ratio ..... 24.00-26.00†

Turkish

48% 3:1 ..... 35.00-37.00†

Domestic

Rail nearest seller

18% 3:1 ..... 30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.23

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard
55-60% $2.70-3.20
60-65% 3.25-3.45

Vanadium Ore

Cents per lb V_2O_5

Domestic 31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa., furnace $14.75-15.25
Connellsville, Pa., foundry 18.00-18.50

Oven Foundry

Birmingham, ovens $39.35
Cincinnati, deld. 33.34
Buffalo, ovens 32.00
Chattanooga, Tenn., ovens 30.80
Detroit, ovens 32.00
Pontiac, Mich., deld. 34.95
Saginaw, Mich., deld. 35.63
Erie, Pa., ovens 32.00
Indianapolis, ovens 31.25
Ironton, Ohio, ovens 30.50
Cincinnati, deld. 33.64
Kearny, N. J., ovens 31.25
Milwaukee, ovens 32.00
Neville Island (Pittsburgh), Pa., ovens. 30.75
New Haven, Conn., ovens 31.00
Painesville, Ohio, ovens 32.00
Cleveland, deld. 34.45
Philadelphia, ovens 31.00
St. Louis, ovens 33.00
St. Paul, ovens 31.25
Chicago, deld. 34.78
Swedeland, Pa., ovens 31.00
Terre Haute, Ind., ovens 31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.

Pure benzene 34.00
Xylene, industrial grade 29.00
Creosote 24.00
Naphthalene, 78 deg. 6.00
Toluene, one deg. (deld. east of Rockies) 25.00

Cents per lb, f.o.b. tank cars or tank trucks, deld.

Phenol, 90 per cent grade 14.75

Per ton bulk, f.o.b. cars or trucks, plant.

Ammonium sulfate, regular grade $32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Min 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3c for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16% deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 28.75c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5-7%, Si 4-6%, S 0.03% max., 20.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, 23.50c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max., Si 1.0% max., S 0.03%, 21.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome (Simplex) Cr 63-66% or 68-71%: C 0.025% max., 31.50c; C 0.010% max., 32.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%: C 0.25% max., 33.00c. Cr 65-71%: C 0.06% max., 32.00c; C 0.10% max, 31.75c; C 0.20% max, 31.50c; C 0.50% max, 31.25c; C 1.0% max, 31.00c; C 1.5%, 30.75c; C 2.0% max, 30.50c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%), C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Foundry Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25% max). SM x D, carload, bulk, 20.05c per lb of alloy, carload packed 21.25c, ton lot 22.50c, less ton lot 23.70c. Delivered. Spot, add 0.25c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 22.50c per lb contained Cr and 14.60c per lb contained Si; Cr 33-36%, Si 45-48%, C 0.05% max, 22.50c per lb contained Cr, 14.60c per lb contained Si.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 14.6c per lb contained Si. Packed, c.l. 17.1c, ton lot 18.55c, less ton 20.20c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

BRIQUETED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.49 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $5.25 per lb (all quantities) of contained W. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-77% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorous: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $120 per gross ton.

Ferromolybdenum: (65-75%). Per lb of contained Mo in 200-lb container, f.o.b. Langeloth and Washington, Pa., $1.76 in all sizes except powdered which is $1.82.

Technical Molybdic-Oxide: Per lb of contained Mo, in cans $1.47; in bags, $1.46, f.o.b. Langeloth and Washington, Pa.

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Plymouth Locomotive Works, Division of The Fate-Root-Heath Company, Dept. A-1, Plymouth, Ohio

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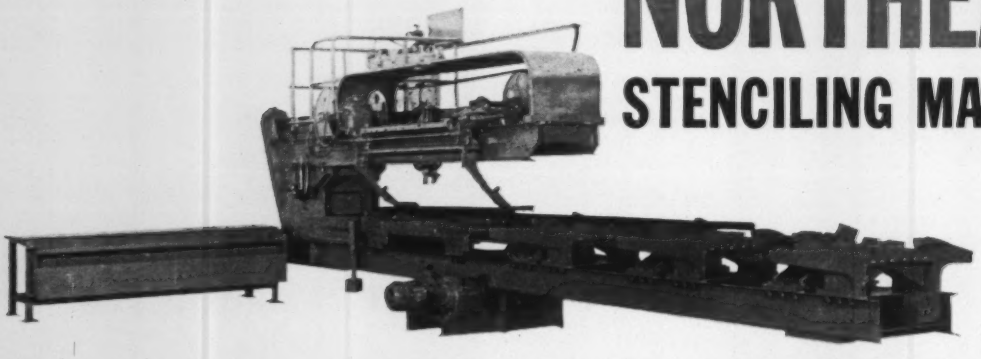

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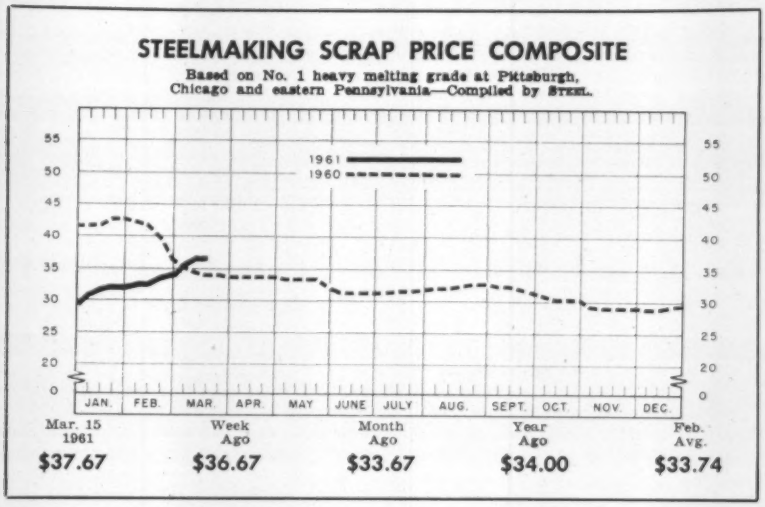


Big Japanese Buy Bolsters Scrap

Market strengthened by purchase of 900,000 tons to be shipped in second quarter to Far East. Prices expected to continue uptrend despite sluggish domestic demand

Scrap Prices, Page 154

● **Philadelphia**—Huge purchases of scrap by Japan in this country for second quarter delivery have stiffened the domestic market on the major steelmaking grades. The Japanese purchases are estimated to be at least 900,000 tons. They are said to have been made at prices higher than those paid for first quarter tonnage.

● **New York**—Japan has closed on an estimated 900,000 tons of steel scrap for shipment from this country during the second quarter. The deal has strengthened brokers' buying prices on several grades. No. 1 heavy melting and No. 1 bundles are $29-$30, No. 2 heavy melting $22-$23, and No. 2 bundles $18-$19 —increases are $1 in each case. Low phos structurals and plates are also up $1 to $32-$33. Domestic buying is slack.

● **Pittsburgh**—The market is stable but inactive in the wake of strong bidding on the railroad lists. Railroad No. 1 heavy melting scrap jumped $4 a ton, and other grades went up $2 to $3. Brokers say there is little support here for the high export prices. Consumers aren't inclined to lay scrap down for speculative reasons.

● **Chicago** — Following the recent surge in prices on open hearth and electric furnace scrap, some specialty grades have moved up $2 a ton, and borings and turnings are up $1. The district steelmaking rate is only a shade better, but there is more optimism concerning late second quarter improvement.

● **Cleveland** — Although steel mill interest in scrap continues to be restricted, the market is firm. Not much change in the situation is anticipated until monthend when April auto lists come out for bids. It's expected that bids will be higher. Better sentiment in the trade is accompanying a seasonal upturn in some lines of steel consumption. Continued heavy exports, particularly to Japan, are also influencing optimism for the immediate future.

● **Buffalo** — Strength in railroad scrap was reported last week. Re-rolling rails sold $1 higher at $58.50, and the railroad lists generally reflected price boosts of $1 to $5 a ton. No. 2 heavy melting steel sold in limited tonnage at $25, up $1, but other open hearth grades held unchanged. The market undertone is strong, reflecting heavy export demand.

● **Detroit** — Exports are providing the chief market support here. Some material being bought is to fill short orders. Prices run up to $34, delivered dock, for No. 1 steel. Small local orders are being placed for specialty grades that require extra processing.

● **Cincinnati**—Prices are unchanged on the principal steelmaking grades, but the market is strong. No. 1 heavy melting is quoted $30-$31 by brokers. Covering of mill orders for March shipment is reported increasingly difficult. Higher prices and larger tonnage demands are expected next month. The pressure of export demand is being felt here.

● **St. Louis**—The market is strong, and prices are rising on heavy demand. Exports are influencing the trend. Local consumers have been forced to up their offering prices to hold material in the district. Exporters are still pushing for tonnage. The open hearth grades are quoted $1 to $4 higher than they were a week ago, and the cast iron grades are up $2. Some railroad scrap is quoted $1 to $2 higher.

● **Birmingham** — Reflecting export demand, the market is stronger. Several grades are quoted $1 higher, including No. 2 heavy melting, machine shop turnings, bar crops and plate, structurals. Also quoted $1 higher are No. 1 wheels, No. 1 railroad heavy melting, random length rails, angles, and splice bars.

● **Houston** — Exporters are paying $40-$41 for No. 1 heavy melting steel, $36-$37 for No. 2 heavy melting, and $26-$27 for No. 2 bundles. The latter grade is in oversupply.

● **Seattle** — The higher prices recently announced are being maintained. Supplies are expected to increase with better weather. Exporters are stockpiling, anticipating heavy Japanese commitments shortly. Japanese buyers are now negotiating for second quarter tonnage.

(*Please turn to Page* 159)

Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Mar. 15, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 15	$37.67
Mar. 8	36.67
Feb. Avg.	33.74
Mar. 1960	34.00
Mar. 1956	50.21

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	34.00-35.00
No. 2 heavy melting	30.00-31.00
No. 1 dealer bundles	34.00-35.00
No. 2 bundles	28.00-29.00
No. 1 busheling	34.00-35.00
No. 1 factory bundles	44.00-45.00
Machine shop turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Short turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	36.00-37.00
3 ft and under	35.00-36.00
Heavy turnings	27.00-28.00
Punchings & plate scrap	40.00-41.00
Electric furnace bundles	*43.00-44.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
Stove plate	37.00-38.00
Unstripped motor blocks	29.00-30.00
Clean auto cast	34.00-35.00
Drop broken machinery	*47.00-48.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*39.00-40.00*
Rails, 2 ft and under	*52.00-53.00*
Rails, 18 in. and under	*53.00-54.00*
Random rails	*46.00-47.00*
Angles, splice bars	*43.00-44.00*
Railroad specialties	*46.00-47.00*
Rails, rerolling	*57.00-58.00*

Stainless Steel Scrap

18-8 bundles & solids	180.00-185.00
18-8 turnings	105.00-110.00
430 bundles & solids	90.00-95.00
430 turnings	50.00-55.00

CHICAGO

No. 1 hvy melt., indus.	37.00-38.00
No. 1 hvy melt., dealer	35.00-36.00
No. 2 hvy melting	30.00-31.00
No. 1 factory bundles	40.00-41.00
No. 1 dealer bundles	36.00-37.00
No. 2 bundles	*23.00-24.00*
No. 1 busheling, indus.	37.00-38.00
No. 1 busheling, dealer	35.00-36.00
Machine shop turnings	*16.00-17.00*
Mixed borings, turnings	*18.00-19.00*
Shovel turnings	*18.00-19.00*
Cast iron borings	*18.00-19.00*
Cut structurals, 3 ft	*42.00-43.00*
Punchings & plate scrap	*45.00-46.00*

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	38.00-39.00
Unstripped motor blocks	34.00-35.00
Clean auto cast	47.00-48.00
Drop broken machinery	47.00-48.00

Railroad Scrap

No. 1 R.R. heavy melt.	39.00-40.00
R.R. malleable	45.00-46.00
Rails, 2 ft and under	*51.00-52.00*
Rails, 18 in. and under	*52.00-53.00*
Angles, splice bars	*43.00-44.00*
Axles	*58.00-59.00*
Rails, rerolling	*58.00-59.00*

Stainless Steel Scrap

18-8 bundles, solids	175.00-180.00
18-8 turnings	100.00-105.00
430 bundles & solids	85.00-90.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*27.00-28.00*
No. 2 heavy melting	21.00-22.00
No. 1 bundles	*30.00-31.00*
No. 2 bundles	19.00-20.00
No. 1 busheling	*27.00-28.00*
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	31.00-32.00
Stove plate	25.00-26.00
Heavy breakable	24.00-25.00
Unstripped motor blocks	21.00-22.00
Charging box cast	26.00-27.00
Clean auto cast	37.00-38.00

CLEVELAND

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	21.00-22.00
No. 1 factory bundles	40.00-41.00
No. 1 bundles	34.00-35.00
No. 2 bundles	19.00-20.00
No. 1 busheling	34.00-35.00
Machine shop turnings	12.00-13.00
Shovel turnings	16.00-17.00
Mixed borings, turnings	16.00-17.00
Cast iron borings	16.00-17.00
Cut foundry steel	33.00-34.00
Cut structurals, plate, 2 ft and under	40.00-41.00
Low phos. punchings & plate	35.00-36.00
Alloy free, short shovel turnings	18.00-19.00
Electric furnace bundles	36.00-37.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	45.00-46.00
Burnt cast	32.00-33.00
Drop broken machinery	46.00-47.00

Railroad Scrap

R.R. malleable	45.00-46.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	52.00-53.00
Rails, random lengths	44.00-45.00
Cast steel	42.00-43.00
No. 1 railroad cast	48.00-49.00
Railroad specialties	47.50-48.50
Angles, splice bars	43.50-44.50
Rails, rerolling	56.00-57.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	155.00-160.00
18-8 turnings	70.00-75.00
430 clips, bundles, solids	70.00-75.00
430 turnings	15.00-25.00

YOUNGSTOWN

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	24.00-25.00
No. 1 busheling	37.00-38.00
No. 1 bundles	37.00-38.00
No. 2 bundles	22.00-23.00
Machine shop turnings	14.00-15.00
Shovel turnings	19.00-20.00
Cast iron borings	19.00-20.00
Low phos.	39.00-40.00
Electric furnace bundles	39.00-40.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00

BUFFALO

No. 1 heavy melting	29.00-30.00
No. 2 heavy melting	*24.00-25.00*
No. 1 bundles	29.00-30.00
No. 2 bundles	20.00-21.00
No. 1 busheling	29.00-30.00
Shovel turnings	16.00-17.00
Machine shop turnings	12.00-13.00
Cast iron borings	14.00-15.00
Low phos. structurals and plates, 2 ft and under	39.00-40.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	36.00-37.00
No. 1 machinery	43.00-44.00

Railroad Scrap

Rails, random lengths	42.00-43.00
Rails, 3 ft and under	48.00-49.00
Rails, rerolling	*57.50-58.50*
Railroad specialties	41.00-42.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	27.50-28.50
No. 1 bundles	31.00-32.00
No. 2 bundles	21.00-22.00
No. 1 busheling	30.00-31.00
Machine shop turnings	11.00-12.00
Mixed borings, turnings	12.00-13.00
Shovel turnings	13.00-14.00
Cast iron borings	11.00-12.00
Low phos. 18 in.	37.00-38.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable cast	28.00-29.00
Charging box cast	35.00-36.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00-34.00*
Rails, 18 in. and under	*46.00-47.00*
Rails, random lengths	*40.00-41.00*

PHILADELPHIA

No. 1 heavy melting	*42.00*
No. 2 heavy melting	*38.00*
No. 1 bundles	*43.00†*
No. 2 bundles	*28.00*
No. 1 busheling	*43.00†*
Electric furnace bundles	42.00
Mixed borings, turnings	15.00
Shovel turnings	21.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	41.00-44.00
Couplers, springs, wheels	44.00-45.00
Rail crops, 2 ft & under	50.00-52.00

Cast Iron Grades

No. 1 cupola	39.00
Heavy breakable cast	39.00
Drop broken machinery	49.00-50.00
Malleable	46.00†

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	*29.00-30.00*
No. 2 heavy melting	*22.00-23.00*
No. 1 bundles	*29.00-30.00*
No. 2 bundles	*18.00-19.00*
Machine shop turnings	3.50-4.00†
Mixed borings, turnings	4.00-4.50†
Shovel turnings	5.00-6.00†
Low phos. structurals & plates	*32.00-33.00*

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	23.00-24.00
Heavy breakable	28.00-29.00

Stainless Steel

18-8 sheets, clips, solids	155.00-160.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	23.00-24.00
No. 2 heavy melting	19.00-20.00
No. 1 bundles	23.00-24.00
No. 1 busheling	23.00-24.00
Machine shop turnings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	30.00-30.50
No. 1 machinery cast	40.00-42.00

BIRMINGHAM

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	*23.00-24.00*
No. 1 bundles	32.00-33.00
No. 2 bundles	20.00-21.00
No. 1 busheling	32.00-33.00
Cast iron borings	10.00-11.00
Machine shop turnings	*16.00-17.00*
Shovel turnings	18.00-19.00
Bar crops and plates	*38.00-39.00*
Structurals & plate	*37.00-38.00*
Electric furnace bundles	34.00-35.00
Electric furnace:	
3 ft and under	34.00-35.00
2 ft and under	35.00-36.00

Cast Iron Grades

No. 1 cupola	45.00-46.00
Stove plate	45.00-46.00
Unstripped motor blocks	32.00-33.00
No. 1 wheels	*35.00-36.00*

Railroad Scrap

No. 1 R.R. heavy melt.	*33.00-34.00*
Rails, 18 in. and under	45.00-46.00
Rails, random lengths	*38.00-39.00*
Angles, splice bars	*38.00-39.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	35.00
No. 2 heavy melting	29.00
No. 1 bundles	35.00
No. 2 bundles	26.00
No. 1 busheling	*35.00*
Machine shop turnings	*18.00*
Shovel turnings	*20.00*

Cast Iron Grades

No. 1 cupola	40.00
Charging box cast	*35.00*
Heavy breakable cast	*33.00*
Unstripped motor blocks	*35.00*
Clean auto cast	41.00
Stove plate	35.00

Railroad Scrap

No. 1 R.R. heavy melt.	35.00
Rails, random lengths	*39.00†*
Rails, rerolling	*52.00*
Rails, 18 in. and under	43.00
Angles, splice bars	*40.00†*

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	35.00-36.00†
No. 2 heavy melting	31.00
No. 1 bundles	35.00-36.00
No. 2 bundles	21.00-22.00
Machine shop turnings	7.00-8.00†
Low phos. plate & structurals:	
3 ft	36.00-37.00
2 ft and under	40.00-41.00

Cast Iron Grades

No. 1 cupola	36.00-37.00
Heavy breakable	24.00
Foundry malleable	29.00-30.00†
Unstripped motor blocks	30.00-31.00

Railroad Scrap

R.R. heavy melt. (3 ft)	36.00-37.00

LOS ANGELES

No. 1 heavy melting	30.00
No. 1 hvy melt (export)	*40.00-43.00*
No. 2 heavy melting	27.00
No. 2 hvy melt (export)	*37.00-40.00*
No. 1 bundles	25.00
No. 2 bundles	*24.00-27.00*
No. 2 bundles (export)	22.00*
Machine shop turnings	12.00
Shovel turnings	13.00
Cast iron borings	13.00
Cut structurals and plate 1 ft and under	40.00

Cast Iron Grades

No. 1 cupola	*46.00*

Railroad Scrap

No. 1 R.R. heavy melt.	34.00-36.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	41.00
No. 2 heavy melting	38.00
No. 2 bundles	23.00-24.00
Shovel turnings	13.00
Electric furnace bundles	45.00-47.00

Cast Iron Grades

No. 1 cupola	44.00
Heavy breakable	39.00
Unstripped motor blocks	36.00
Stove plate (f.o.b. plant)	39.00

SEATTLE

(Prepared, f.o.b. car)

No. 1 heavy melting	41.00
No. 1 hvy (unprepared)	38.00
No. 2 heavy melting	38.00
No. 2 hvy (unprepared	35.00
No. 2 bundles	23.00-24.00
Shovel turnings	15.00
Electric furnace bundles	47.00

Cast Iron Grades

No. 1 cupola	42.00
Heavy breakable cast	39.00
Unstripped motor blocks	36.00
Stove plate (f.o.b. plant)	39.00

SAN FRANCISCO

No. 1 heavy melting	*40.00***
No. 2 heavy melting	*37.00***
No. 1 bundles	*34.00***
No. 2 bundles	*25.00***
Machine shop turnings	*20.00***
Mixed borings, turnings	*20.00***
Cast iron borings	*20.00***
Heavy turnings	*20.00***
Shovel turnings	*20.00***
Cut structurals, 3 ft	40.00

Cast Iron Grades

No. 1 cupola	46.60-48.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

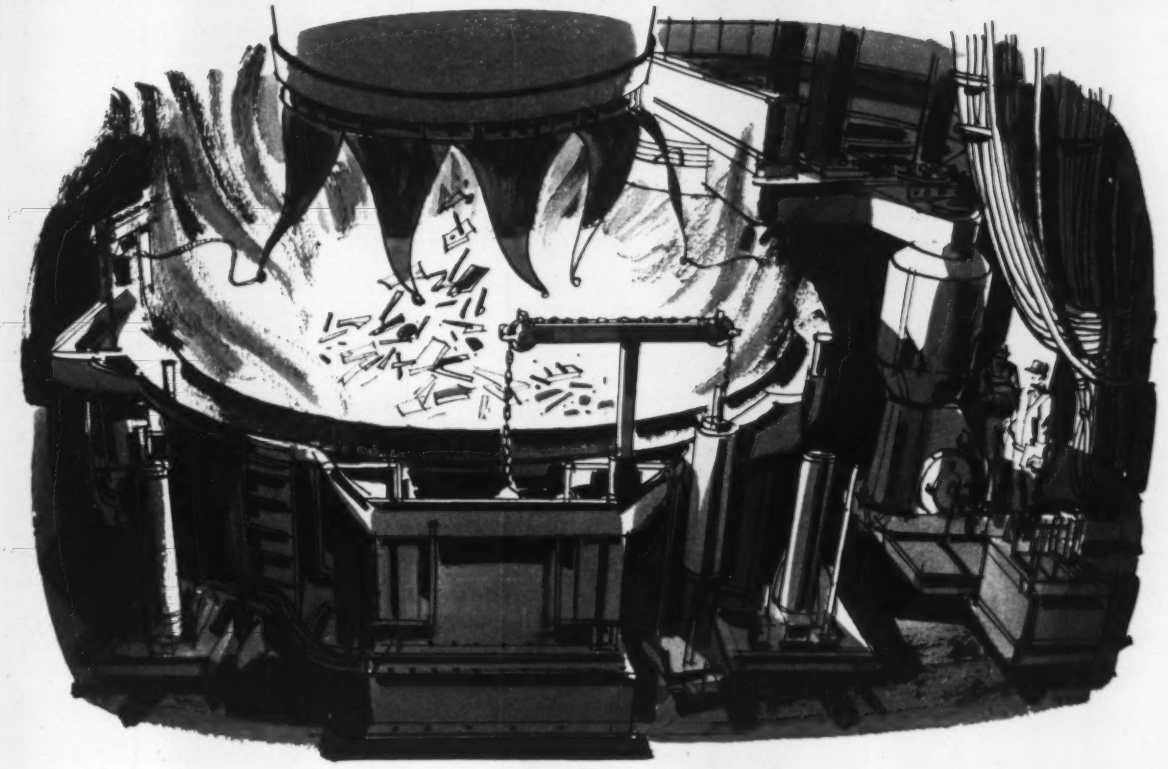
No. 1 heavy melting	28.00
No. 2 hvy melt, 2 ft & under	27.00
No. 1 bundles	28.00
No. 2 bundles	17.50
Mixed steel scrap	20.00
Mixed borings, turnings	12.00
Busheling, new factory:	
Prepared	28.00
Unprepared	22.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

*For export add $4 dock charge.
**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

DANGEROUS INTRUDERS IN IRON AND STEEL SCRAP



COPPER . . . FRIEND OR FOE?

Because it is one of the most adaptable of metals, copper can be used either in its pure state or as an alloy with a wide variety of other metals.

The steel industry values copper as an element in certain steel compositions because it acts as a strengthening agent. Its presence also increases the resistance of steel to the harmful effects of atmospheric corrosion. These qualities make copper an important element in the weight-saving, high strength low alloy steels. For such steels, copper is a friend.

However, if copper enters the furnace as an unknown part of the charge, it becomes an undesired residual element. It will alloy with the molten metal, making the finished steel unfit for its intended use. In certain ranges of composition, it will impair the response of steel to fabrication by hot working or deep drawing. In the electric furnace, it is particularly undesirable. The presence of this non-oxidizable element may make it necessary to divert, or possibly force the scrapping of the entire heat.

When any of these situations occur, copper is a definite foe.

For guaranteed analysis of stainless and alloy steel scrap, look to Luria. Our personnel, equipment and strategically located facilities are specifically geared to work for you. We welcome your inquiry.

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Scrap Exports Stir Controversy

Nonferrous Metal Prices, Pages 158 & 159

EXPORT is the biggest and most controversial word in nonferrous scrap today. To dealers, heavy demand for copper and aluminum scrap from Japan and Europe has proved a bonanza. To buyers, exports can be a threat to supplies.

At San Francisco last week, scrapmen from all over the U. S. (the 48th annual convention of the National Association of Secondary Material Industries Inc.) pinpointed the pros and cons of the exports argument and took a look at the supply-demand-price outlook for the remainder of 1961. The market shapes up like this:

• **Copper**—Exports have been unusually heavy for over a year. In 1960, exports of copper-base scrap hit a record 184,000 tons compared with 40,000 tons in 1959 and 170,000 tons in 1954, the previous high, reports the Copper Division of the Business & Defense Services Administration.

The U. S. also exported 435,000 tons of refined copper in 1960, the highest total since 1928.

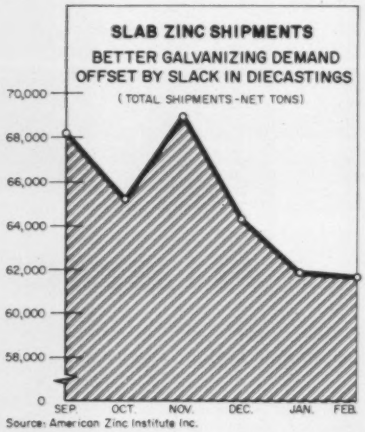
Scrap exports can be explained by the simple law of supply and demand: They flow to the market that pays the highest price. Japan and Europe have had booming industrial activity, while the U. S. was going through a recession.

Today, there's a lack of copper scrap in this country. Exports are a big reason. Another is that less new scrap has been generated because of reduced U. S. industrial activity. And a severe winter throughout much of the U. S. has hampered collections, preparation, and delivery.

The shortage is not acute because U. S. demand hasn't been high. Now there's some indication copper demand is on the way back up. If that's true, and scrap exports continue to be high, a shortage in scrap will develop.

During a period like the one we're going through, scrap is almost detached from the new metal market and becomes a market of its own. It's possible for scrap prices to go up to a point where the differential between them and new copper is small.

Many scrapmen think overseas demand has hit its peak and may ease off a little over the next few months. If not, and if the shortage becomes more acute, the smelters may again ask the government to limit scrap exports under the Export Control Act of 1949. Two months ago, such a request was turned down, but supplies are more limited now, and the price is higher.



Source: American Zinc Institute Inc.

• **Aluminum**—Smelters of aluminum also see exports of scrap as a threat. They maintain scrap outflow hampers the secondary industry's growth and puts it in a less favorable competitive position for the automotive business with the "hot metal" facilities run by the primary producers.

Scrapmen say there's no shortage of aluminum scrap. Business is fair in the U. S., good overseas. Prices are higher but they haven't risen as much as in copper.

• **Lead-Zinc**—The scrap market for both metals is quiet. Not much tonnage is moving either here or abroad, reflecting the generally weak demand that has plagued the metals for several months. Scrap prices are standing still.

Little change is seen anytime soon.

• **Miscellaneous Scrap**—Nickel and Monel scrap have been in fairly steady demand from users both here and abroad. Demand is under that of 1959, but sales should be as good or better than those of 1960. Prospects for the remainder of the year are good. Generation of scrap hasn't been great, so dealers don't have big inventories. If business picks up substantially, supplies could get tight.

The current price is weaker than it was, but dealers term it "satisfactory." They look for prices to strengthen over the year.

The market is steady for pure tungsten and molybdenum scrap (and to a lesser extent their alloys). Titanium is in the same category. Demand for those materials is dependent on defense and space programs, not the general economy.

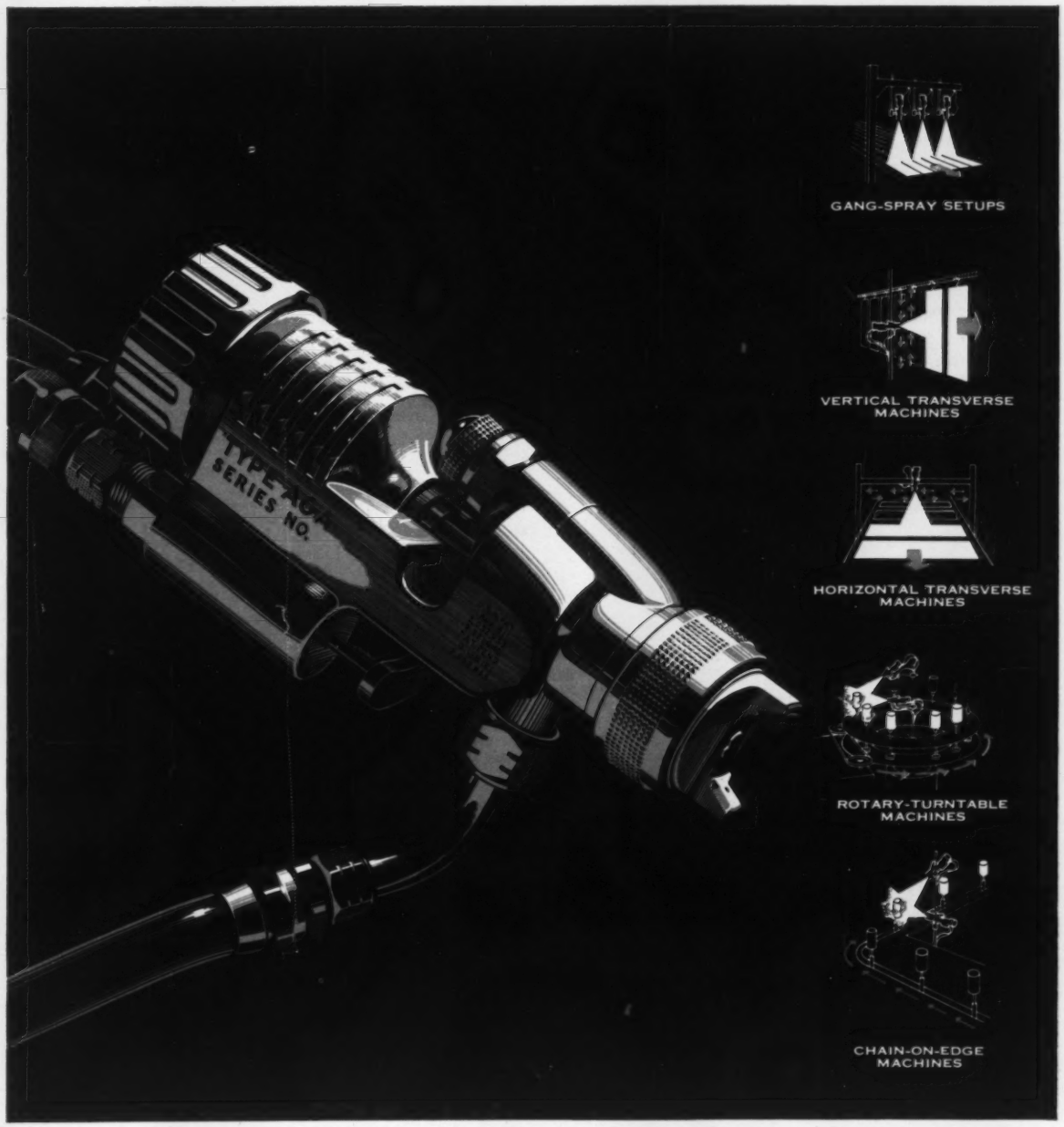
Kaiser at Half Capacity

Kaiser Aluminum & Chemical Corp., with headquarters at Oakland, Calif., is operating its primary aluminum facilities at a little over 50 per cent of capacity, D. A. Rhoads, president, revealed at the convention of the Secondary Material Industries group.

Kaiser has 609,500 tons of annual primary aluminum capacity at four plants. (In 1960, the company produced 488,077 tons of primary aluminum and sold 465,394 tons of aluminum products.)

Of the company's nine reduction lines at Chalmette, La., five are operating.

At the Mead, Wash., plant near Spokane, three of eight lines are running. Since Feb. 11, one line has been down at the four line reduction plant at Ravenswood, W. Va. The reduction plant at Tacoma, Wash., has been shut down for some time, Mr. Rhoads said.



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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 50 lb ingots, 26.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.90; No. 43, 26.20; No. 195, 27.60; No. 214, 31.50; No. 356, 26.80, 50 lb ingots.

Antimony: R.M.M. brand, 99.5%, 29.00; Lone Star brand, 29.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.50-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.60 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $55 per lb and up nom.

Copper: Electrolytic, 29.00 deld.; custom smelters, 29.00; lake, 29.00 deld.; fire refined, 28.75 deld.

Germanium: First reduction, ingots, less than 1 kg, 36.00-37.50 per gram; 1-10 kg, 30.50-32.00 per gram; 10 kg or more, 28.10-29.99 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld.; 24-90 lb, $9.50; 100-499 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75, f.o.b. Velasco, Tex.

Mercury: Open market, spot, N. York, $206-208 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 74.00; 10-lb pigs, unpacked, 78.25; "XX" nickel shot, 79.50; "F" nickel shot for addition to cast iron, in kegs, 74.50; "F" nickel, 5 lb ingots, 75.50. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.01; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 69.60.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l. 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $3.50-5 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot, 104.25; prompt, 104.125.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max.), $1.60 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75-2.85 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.10-4.00.

Zinc: Prime western, 11.50; brass special, 11.75; intermediate, 12.00, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.85; special high grade, 13.00 deld. Die casting alloy ingot No. 3, 14.25; No. 2, 14. 75; No. 5, 14.50 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $8-8.50 per lb; 100-500 lb, $7.25-7.50 per lb; 500-1000 lb, $6.50-7.25; over 1000 lb, $6.50 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 25.00-26.00; No. 12 foundry alloy (No. 2 grade), 22.75; 5% silicon alloy, 0.60 Cu max., 24.00; 13 alloy, 0.60 Cu max., 24.00; 195 alloy, 25.75; 108 alloy, 23.25. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 23.75; grade 2, 22.50; grade 3, 21.50; grade 4, 21.00.

Brass Ingot: Red brass, No. 115, 28.25; tin bronze, No. 225, 38.00; No. 245, 32.50; high leaded tin bronze, No. 305, 32.75; No. 1 yellow, No. 405, 24.25; manganese bronze, No. 421, 28.00.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.935, f.o.b. Temple, Pa., or Reading, Pa.; rod, bar, wire, $1.935, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 34.355; l.c.l., 34.98. Weatherproof, 20,000-lb lots, 35.55; l.c.l., 36.30.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill.) Sheet and strip, $6.75-15.50; sheared mill plate, $5.25-9.00; wire, $5.55-9.50; forging billets, $3.20-4.75; hot-rolled and forged bars, $3.80-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $14.00-25.00; H.R. strip, $14.00-22.90; C.R. strip, $16.00-35.00; forged or H.R. bars, $11.00-17.40.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	138	120	138
Strip, C.R.	124	108	138
Plate, H.R.	130	110	126
Rod, Shapes, H.R.	107	89	109
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.136	24-72	72-180	45.40-48.00
0.136-0.096	24-72	72-180	45.90-48.80
0.096-0.077	24-72	72-180	46.40-50.30
0.077-0.068	24-72	72-180	46.90-52.10
0.068-0.061	24-72	72-180	46.90-55.00
0.061-0.048	24-72	72-180	47.40-57.70
0.048-0.038	24-72	72-180	47.90-60.50
0.038-0.030	24-72	72-180	48.40-65.30
0.030-0.024	24-72	72-180	48.90-67.20
0.024-0.019	24-60	72-180	49.40-59.90
0.019-0.017	24-48	72-144	50.30-57.00
0.017-0.015	24-48	72-144	51.20-58.00
0.015-0.014	24-36	72-144	52.30
0.014-0.012	24-36	72-144	53.50
0.012-0.011	24-36	72-144	54.60
0.011-0.0095	24-46	72-144	56.20
0.0095-0.0085	24-36	72-96	57.50
0.0085-0.0075	24-36	72-96	59.20
0.0075-0.007	24-36	72-96	60.80
0.007-0.006	24-36	72-96	62.50

ALUMINUM (continued)

Plates and Circles: Thickness, 0.25-3 in.; width or diam., 24-60 in.; length, 72-240 in., mill finish.

Alloy	Plate Base	Circle Base
1100, 3003-F	44.60	50.90
5050-F	45.70	50.50
3004-F	46.70	52.40
5052-F	47.30	53.10
6061-T6	47.80	53.90
2024-T4*	51.80	58.90
7075-T6*	60.50	67.90

*24-48 in. width or diam., 72-180 in. lengths.

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam	Round		Hexagonal	
(in.)*	2011-T3	2017-T4	2011-T3	2017-T4
0.125	74.90	77.30	....	....
0.188	63.20	63.20	....	80.10
0.250	60.00	62.60	72.70	74.10
0.375	59.20	63.80	71.00	72.00
	2011-T3	2017-T451	2011-T3	2017-T451
0.500	59.20	63.80	71.00	72.00
0.625	59.20	63.80	67.80	67.90
0.750	57.70	62.00	61.60	63.80
0.875	57.70	62.00	61.60	63.80
1.000	57.70	62.00	61.60	63.80
1.125	55.30	59.50	59.50	61.50
1.250	55.30	59.50	59.50	61.50
1.375	55.30	59.50	59.50	61.50
1.500	55.30	59.50	59.50	61.50
1.625	53.00	56.70	....	59.30
1.750	53.00	56.70	58.30	59.30
1.875	53.00	56.70	....	59.30
2.000	53.00	56.70	58.30	59.30
2.250	51.50	55.00	....	59.30
2.500	51.50	55.00	....	59.30
2.750	49.90	53.20	....	59.30
3.000	49.00	53.20	....	59.30
3.250	....	53.20	....	....
3.375	....	53.20	....	....

*Selected sizes.

Forging Stock: Round, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 47.50-57.60; 6061, 43.50-57.60; 7075, 61.80-71.90; 7079, 66.80-76.90.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.60
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. widths; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	Com. Grade (AZ31C)	Spec. Grades (AZ31B)
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 22.00-22.50; No. 2 heavy copper and wire, 20.75-21.25; light copper, 18.25-18.75; No. 1 composition red brass, 18.50-19.00; No. 1

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES e (Based on copper at 29.00c)			
	Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	Clean Heavy	Rod Ends	Clean Turnings
Copper	54.13b	51.36c	....	55.32	25.000	25.000	24.250
Yellow Brass	48.10	33.71d	48.39	52.26	19.250	18.375	17.375
Low Brass, 80%	50.65	50.39	50.94	54.71	21.375	21.125	20.625
Red Brass, 85%	51.54	51.48	51.83	55.60	22.250	22.000	21.500
Com. Bronze, 90%	52.98	52.92	53.27	56.79	23.000	22.750	22.250
Manganese Bronze	56.56-56.59	50.22-50.24	60.47	....	18.000	17.750	17.250
Muntz Metal	50.94	46.25	....	....	18.125	17.875	17.375
Naval Brass	52.86	46.67	59.17	57.02	18.000	17.750	17.250
Silicon Bronze	59.49	58.68	58.78	77.90	24.500	24.250	23.500
Nickel Silver, 10%	63.66	65.99	65.74	....	24.125	23.875	12.062
Phos. Bronze, A-5%	74.59	75.09	74.34	76.52	26.125	25.875	24.875

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 17.50-18.00; new brass clippings, 15.75-16.25; light brass, 12.75-13.25; heavy yellow brass, 13.75-14.25; new brass rod ends, 14.75-15.25; auto radiators, unsweated, 14.00-14.50; cocks and faucets, 15.50-16.00; brass pipe, 16.00-16.50.

Lead: Soft scrap lead, 7.00-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.00-8.25; electrotype, 7.50-7.75; mixed babbitt, 9.00-9.50.

Monel: Clippings, 23.00-23.50; old sheets, 22.00-23.00; turnings, 16.50-17.00; rods, 22.00-23.00.

Nickel: Sheets and clips, 52.00-54.00; rolled anodes, 52.00-54.00; turnings, 40.00; rod ends, 52.00-54.00.

Zinc: Old zinc, 2.75-3.00; new diecast scrap, 2.75-3.00; old diecast scrap, 1.00-1.25.

Aluminum: Old castings and sheets, 9.00-9.50; clean borings and turnings, 4.50-5.00; segregated low copper clips, 11.00-11.50; segregated high copper clips, 10.00-10.50; mixed low copper clips, 10.50-11.00; mixed high copper clips, 10.00-10.50.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 7.50-8.00; segregated low copper clips, 15.50-16.00; segregated high copper clips, 13.50-14.00; mixed low copper clips, 13.00-13.50; mixed high copper clips, 12.00-12.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 10.50-11.00; clean borings and turnings, 8.50-9.00; segregated low copper clips, 14.00; segregated high copper clips, 13.00; mixed low copper clips, 13.00; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 55.00; light scrap, 50.00; turnings and borings, 35.00.
Copper and Brass: No. 1 heavy copper and wire, 25.50; No. 2 heavy copper and wire, 23.50; light copper, 21.25; refinery brass (60% copper) dry copper content, 22.00.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 25.50; No. 2 heavy copper and wire, 23.75; light copper, 21.50; No. 1 composition borings, 21.00-21.50; No. 1 composition solids, 21.50-22.00; heavy yellow brass solids, 16.50-17.50; yellow brass turnings, 14.50-16.50; radiators, 17.00-17.50.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.
Copper: Flat-rolled, 46.04; oval, 42.50; electrodeposited, 38.00; cast, 40.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb 114.25; 100-499 lb, 112.00; 500-4999 lb, 107.50; 5000-29,999 lb, 105.25; 30,000 lb, 103.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 122.50; 200-499 lb, 121.00; 500-999 lb, 120.50; 1000 lb or more, 120.00.

Zinc: Balls, 18.75; flat tops, 18.75; flats 21.50; ovals, 20.75, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.

Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.00; 2000-5900 lb, 13.00; 6000-11,900 lb, 12.75; 12,000-22,900 lb, 12.50; 23,000 lb or more, 12.00.

Nickel-Chloride: 100 lb, 45.00 200 lb, 43.00; 300 lb, 42.00; 400-4900 lb, 40.00; 500-9900 lb, 38.00; 10,000 lb or more, 37.00.

Nickel Sulphate: 5000-22,999 lb, 29.00; 23,000-39,900 lb, 28.50; 40,000 lb or more, 28.00.

Sodium Cyanide (Cyanobrik): 2000 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 80.60; 100-600 lb, 71.20; 700-1900 lb, 68.40; 2000-9900 lb, 66.60; 10,000 lb or more, 65.20.

Stannous Chloride (Anhydrous): 25 lb, 156.20; 100 lb, 151.40; 400 lb, 148.90; 800-19,900 lb, 108.00; 20,000 lb or more, 102.00.

Stannous Sulphate: Less than 50 lb, 141.30; 50 lb, 111.30; 100-1900 lb, 109.30; 2000 lb or more, 107.30.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 153*)

• **Los Angeles**—Japanese buyers are reported paying $3 to $13 more per ton for material than domestic consumers are willing to pay. Dealers' yard stocks are low.

Heavy Exports Gave Scrap Movement Lift in 1960

Consumption of iron and steel scrap in 1960 is estimated to have included 23,560,000 gross tons of purchased material, reports the Institute of Scrap Iron & Steel Inc., Washington. Domestic consumption coupled with exports of 6,412,000 tons brought the marketed total to 30 million tons, about the same as in 1959.

Exports under government license were an important factor in helping hold down the nation's loss of gold. The monthly report of the institute notes that export licenses during February declined to 509,000 gross tons from 705,000 in January. The February figure, however, was ahead of the 377,000 tons licensed in February, 1960.

Consumption of home and purchased material in December (1960) amounted to 3,738,000 tons. Steel mill stocks at the end of that month totaled 7,030,000 tons vs. 7,216,000 in November, and 7,245,000 in January, 1960. Stocks held by foundries and others at the end of December were 1,231,000 tons against 1,242,000 at the end of November, and 1,273,000 at the end of January a year ago.

Structural Shapes . . .

Structural Shape Prices, Page 143

Seasonal influences are bringing out a larger volume of structural work. Shipwork predominates in the East, but there's a fair diversity of work developing throughout the country. New jobs include schools, churches, office and commercial structures, and even a slight pickup in industrial work is noted.

Fabricators are quoting two to three month delivery on the average. Some shops are adding a little to their steel inventories in anticipation of a further expansion in operations. One medium sized plant in the New York area is maintaining an inventory of 60 days. It has been below that level for months.

Bids are in for the Standard Insurance Co.'s building at Portland, Oreg., involving 3000 tons of shapes. Award of 12,000 tons for the Montana missile project is still pending.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2175 tons, viaduct, between Marietta and Nelson Streets, Atlanta, to American Bridge Div., U. S. Steel Corp., Pittsburgh; Wright Contracting Co., Columbus, Ga., general contractor.

1225 tons, transmission towerwork, American Electric Power Co., to Michael Flynn Mfg. Co., Philadelphia.

1183 tons, state highwaywork, Delaware County, Pennsylvania, to Lehigh Structural Steel Co., Bethlehem, Pa.

700 tons, Building 105, Hanford Works, to unstated fabricators; H. Halvorson, Yardley, Wash., general contractor.

600 tons, Hales Ford Bridge over Roanoke River, Virginia, to American Bridge Div., U. S. Steel Corp., Pittsburgh.

555 tons, galvanized transmission towers, American Electric Power Co., Bucyrus, Ohio, to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, plant addition, Crown Cork & Seal Co., Philadelphia, to Bethlehem Fabricators, Bethlehem, Pa.

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Reply Box 918, STEEL
Penton Bldg. Cleveland 13, Ohio

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PROGRESSIVE STEEL MILL desires services of established Salesman familiar with High Carbon Strip and Round Wire Specialties for Atlantic Seaboard. Box No. 907, STEEL, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

SEEKING RESPONSIBLE POSITION AS PLANT SUPERINTENDENT or Mill Superintendent, preferably in aluminum sheet mill. Qualified by successful background in the installation of rolling mill equipment, new product development, and general "trouble shooting" on production problems. Reply Box 914, STEEL, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT BAR AND ROD MILL—Presently employed in same capacity. 47 years of age. 28 years experience in all phases of mill operation including 11 years as a roller. Want to relocate. Will travel. Reply Box No. 916, STEEL, Penton Bldg., Cleveland 13, Ohio.

FABRICATED METAL PARTS SALESMAN with 15 years' O.E.M. experience in the Middle Atlantic States desires selling connection for Atlantic Seaboard. Reply Box No. 915, STEEL, Penton Bldg., Cleveland 13, Ohio.

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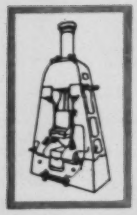


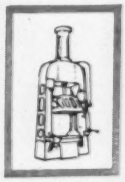
CECO-DROP The most effective and economical gravity drop hammer. Air or steam operated. No boards to change, no back rods to lift. Safer, easier operation. Equipped with non-slip piston rod clamp, ram die-setting control and nylon-cushioned stroke control. New "Blowmatic" program controller for semi-automatic forging available. Sizes 500 lbs. to 10,000 lbs. Ask for Bulletin No. 80-L-7.

FORMING DROP

An air-operated, piston-lift, gravity-drop hammer designed especially for operations common to coining presses, compacting presses, strap hammers, pneumatic drop hammers, etc. May be operated manually, semi-automatic or completely automatic. Electric control system. Sizes 500 lbs. to 5000 lbs. Ask for Bulletin No. 73-L-7.

BOARD DROP HAMMER

The best of the board drop hammers. Belt or motor drive. Unique board clamp arrangement and improved roll design promcte better board life, result in less down time. Unusual strength and rigidity. Sizes 100 lbs. to 5000 lbs. Ask for Bulletin No. 90-L-9.



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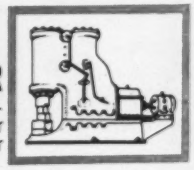
An air-operated impact drop stamp that produces a controlled blow or a "squeeze" instantly, at the will of the operator. Gives a permanent set to all the formable metals—even high strength alloys. Popular in iron foundries as inexpensive, highly productive tool for restriking malleable castings. Sizes from 21" x 18" platen area to 120" x 120" platen area. Ask for Bulletin No. 30-L-5.

STEAM DROP HAMMER

Designed to produce forgings at lowest cost per piece. Unique differential porting on Model "E" makes for the most efficient use of steam or air—greatest economy of power. Unusual strength and rigidity reduces down time, maintains alignment, increases production. Sizes 1000 lbs. to 16,000 lbs. Ask for Bulletin No. 55-L-4.

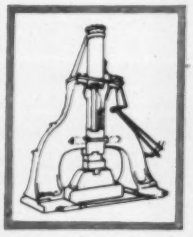


PNEUMATIC HAMMER

Popular motor-driven hammer with self-contained compressor, for flat-die or blacksmithing operations. Ideal for tool dressing, for research laboratory work, etc. An exceptional forging tool, independent of steam or air lines. Sizes 200 lbs. to 5000 lbs. Ask for Bulletin No. 16-L-9.

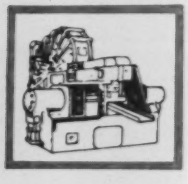
SINGLE FRAME HAMMER

High frame provides greater working space. Specially designed forged alloy steel dies ease stock manipulation. Power-saving cylinder cuts operating costs. Preferred for forging large discs and rings, upsetting high stems, etc. Ram guides supported on 5 sides. Sizes 750 lbs. to 6000 lbs. "Power/trol" power-assist controls on 2500 lb. hammers and larger. Ask for Bulletin No. 1-L-4.



DOUBLE FRAME HAMMER

Large working space for special or routine jobs. Well suited for making large rings, cogging and drawing out toughest alloy steels and high temperature "exotic" metals, making large axle forgings, etc. Heavy 15:1 anvil increases blow effectiveness. Sizes 2000 lbs. to 24,000 lbs. "Power/trol" power-assist controls on 3000 lb. hammers and larger. Ask for Bulletin No. 74-L-7.



THE IMPACTER & CECOMATIC FORGING

The revolutionary Chambersburg Impacter forges by means of horizontally-opposed rams striking the stock simultaneously from both sides. This new concept of the forging process makes possible the continuous, automatic production of drop forgings. Fully described in Bulletin No. 87-L-9.

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When it's a vital part, design it to be FORGED

411 tons, one, three span and one, four span, wide flange, composite beam bridges, Chester (Gassetts), Vt., to City Iron Works Inc., Hartford, Conn.; Miller Construction Co., Windsor, Vt., and Caledonia Sand & Gravel Co. Inc., St. Johnsbury, Vt., joint general contractors; also, 72 tons of steel piling, to Bethlehem Steel Co., Bethlehem, Pa.

312 tons, including 73 tons of concrete reinforcing bars, U. S. access road and bridge, Bangor, Maine, to Bancroft & Martin Rolling Mills Co., South Portland, Maine.

STRUCTURAL STEEL PENDING

3854 tons, state bridgework, FIGE 61-1, Kings County, New York; bids Mar. 29.

3025 tons, McAlpine Dam, Louisville.

2500 tons, propulsion engine altitude test cell, Tullahoma, Tenn.

2200 tons, service building, Columbia-Presbyterian Hospital, New York.

875 tons, state bridgework, FISH 61-6 and FASH 61-7, Monroe County, New York, Lane Construction Corp., low bidder.

800 tons, Robert Treat Hotel addition, Newark, N. J.

800 tons, computer building, General Electric Co., Phoenix, Ariz.

725 tons, state bridgework, FASH 61-9 and FARC 61-32, Ulster County, New York; bids Mar. 29.

600 tons, post office annex and garage, Cincinnati.

599 tons, bridge repairs, New Bedford-Fairhaven, Mass.; bids Mar. 28, Department of Public Works, Boston.

600 tons, addition, St. Mary's Hospital, Waterbury, Conn.; bids extended to Apr. 6.

594 tons, two state highway bridges, Interstate Route 95, Yarmouth, Maine; bids Mar. 22 to Augusta, Maine.

500 tons, warehouse addition, John J. Nesbitt Inc., Philadelphia.

465 tons, Yellowtail dam and powerplant, Lower Bighorn Division, Missouri Basin project, near Hardin, Mont.; bids Apr. 11, Bureau of Reclamation, Denver.

450 tons, senior high school, Paoli, Pa.; bids Mar. 29.

425 tons, state bridgework, FISH 61-3, Warren County, New York; bids Mar. 29.

409 tons, Round Valley Reservoir, Sec. RV 2, Hamden, N. J.; bids opened Mar. 16.

425 tons, six state highway structures, Manchester, N. H.; the Palazzi Corp., Concord, N. H., low on general contract.

420 tons, also 70 tons of reinforcing bars, Washington State, King-Snohomish girder bridge and undercrossing; bids to Olympia, Wash., Mar. 21.

400 tons, rare book library, Yale University, New Haven, Conn.; George A. Fuller Co., New York, general contractor.

380 tons, state bridgework, FARC 61-15, Westchester County, New York; Del Vaso Construction Corp. and Risciano Construction Corp., low on general contract.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1200 tons, 40 ft lengths, deformed, Grade C, intermediate billet steel, Navy, to Oregon Steel Mills, division of Gilmore Steel Corp., Portland, Oreg.

681 tons, viaduct, between Marietta and Nelson Streets, Atlanta, to Connors Steel Div., H. K. Porter Company, Birmingham; Wright Contracting Co., Columbus, Ga., general contractor.

650 tons, Pacific Center Building, Century 21 Exposition, Seattle, to Pacific Coast Div., Bethlehem Steel Co., Seattle; General Construction Co., Seattle, contractor.

380 tons, Science Building, Century 21 Exposition, Seattle, to Soule Steel Co., Seattle; Purvis Construction Co., Spokane, Wash., general contractor.

REINFORCING BARS PENDING

3738 tons, Yellowtail dam and powerplant, Lower Big Horn Division, near Hardin, Mont.; bids Apr. 11 to Bureau of Reclamation, Denver.

364 tons, repairs, two bridges, Fairhaven-New Bedford, Mass.; bids Mar. 28, Department of Public Works, Boston.

330 tons, six highway structures, Manchester, N. H.; the Palazzi Corp., Concord, N. H., low on general contract.

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Coming March 27

IN

STEEL

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The sixth of 25 installments during 1961 on Profit Growth shows that one part of the profit squeeze problem is the unrelenting pressure for higher wages, salaries, and fringes. Next week STEEL will show some of the ways that pressure can be relieved.

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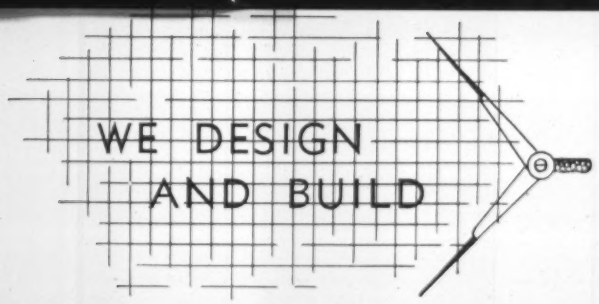

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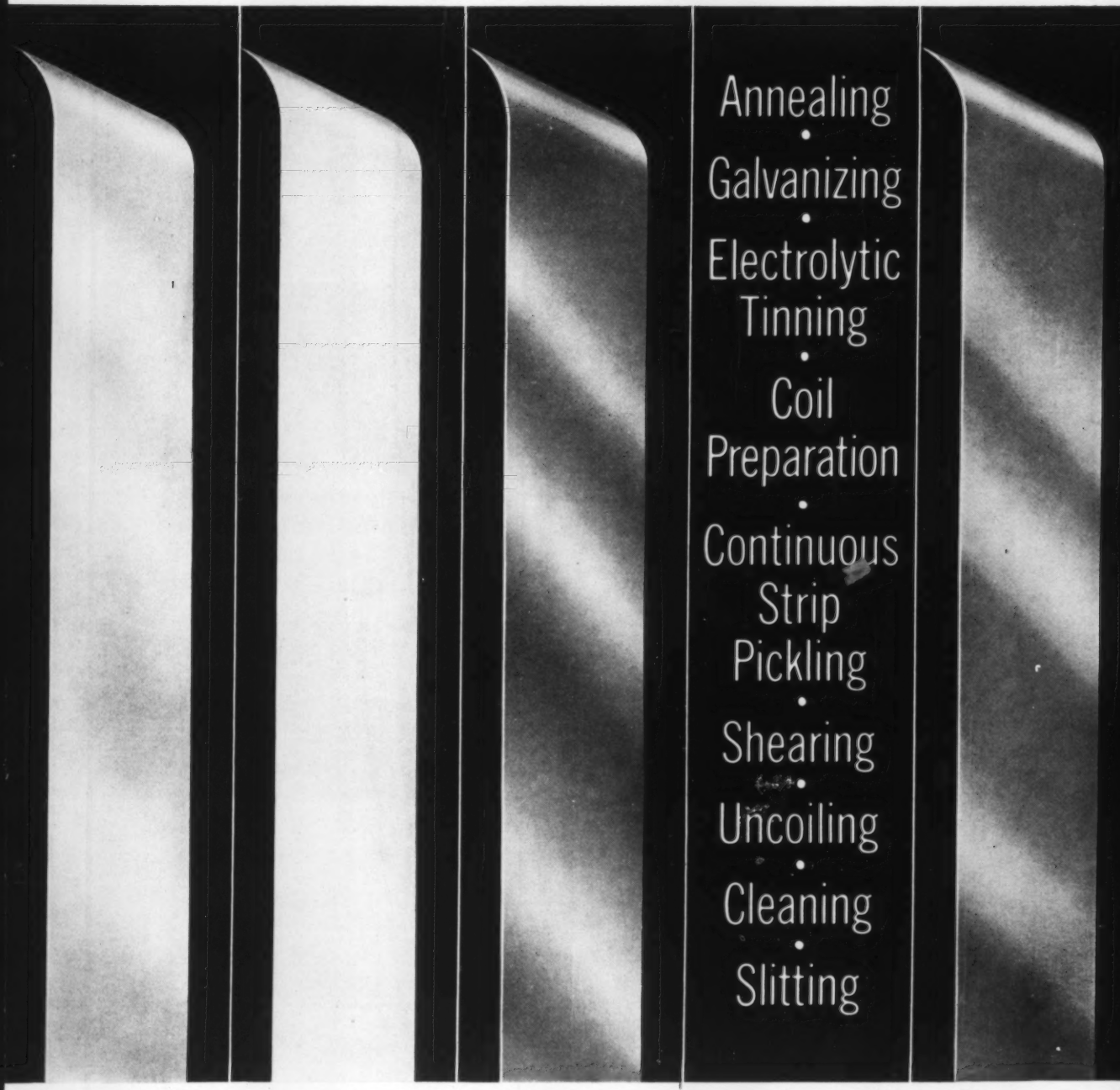

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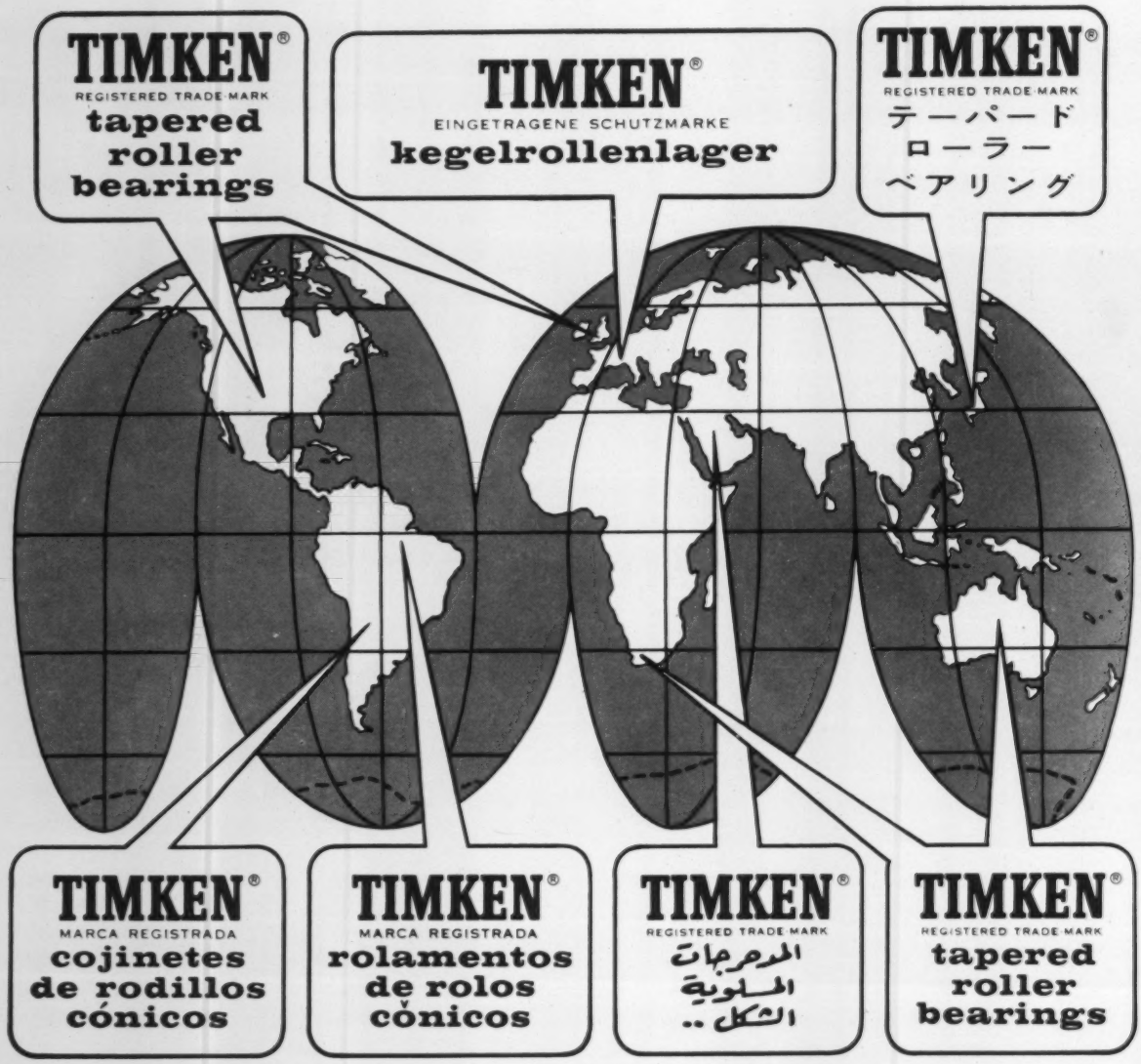

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